OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

(OTTAWA NWR, CEDAR POINT NWR, DARBY DIVISION, NAVARRE DIVISION)

OAK HARBOR, OHIO

1992 ANNUAL WATER MANAGEMENT PROGRAM

NATIONAL WILDLIFE REFUGE SYSTEM
FISH AND WILDLIFE SERVICE
U.S. DEPARTMENT OF THE INTERIOR

OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

ANNUAL WATER MANAGEMENT PROGRAM

REVIEW AND APPROVAL

Approved By: Mark W Blair — Project Leader — Date: 2-6-92

Reviewed By: /s/ James P. Mattsson — Division Biologist 2 — Date: 2-28-92

Reviewed By: William H Hutchinson — Assistant Wildlife Associate Manager 2 — Date: 3/3/92

Approved By: Matthew J. Wilson — Wildlife Associate Manager 2 — Date: 3.9.92

Reviewed by /s/ John V. Ramsour — Regional Engineer — 2-27-92

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1992 WATER MANAGEMENT PLAN

This annual water management plan provides guidelines for water levels during impoundment rehabilitation, moist soil plant production, and spring and fall migrations. The objectives of this comprehensive plan is to ensure a diversified habitat is available to a variety of wildlife species throughout the planning year.

In the past, most of Ottawa's management capabilities revolved around gravity drainage. In the mid to late 1970's, energy conservation was a factor in the design of water control structures. Dual flap gates on screw gates that faced in opposite directions were installed. Gravity was all the energy needed and the system worked well during those years. The key was to have a water source that periodically fluctuated and wind tides on Lake Erie cooperated with each blow from the southwest and northeast.

With record high water levels set in 1985, 1986 and early 1987, gravity control structures were no longer adequate. High water levels in pools could not be relieved without a major cost in money and human effort to pump it out with portable Crisafulli pumps. Severe erosion took place on all unprotected dikes. Defects in dikes caused by woodchuck and muskrat became evident.

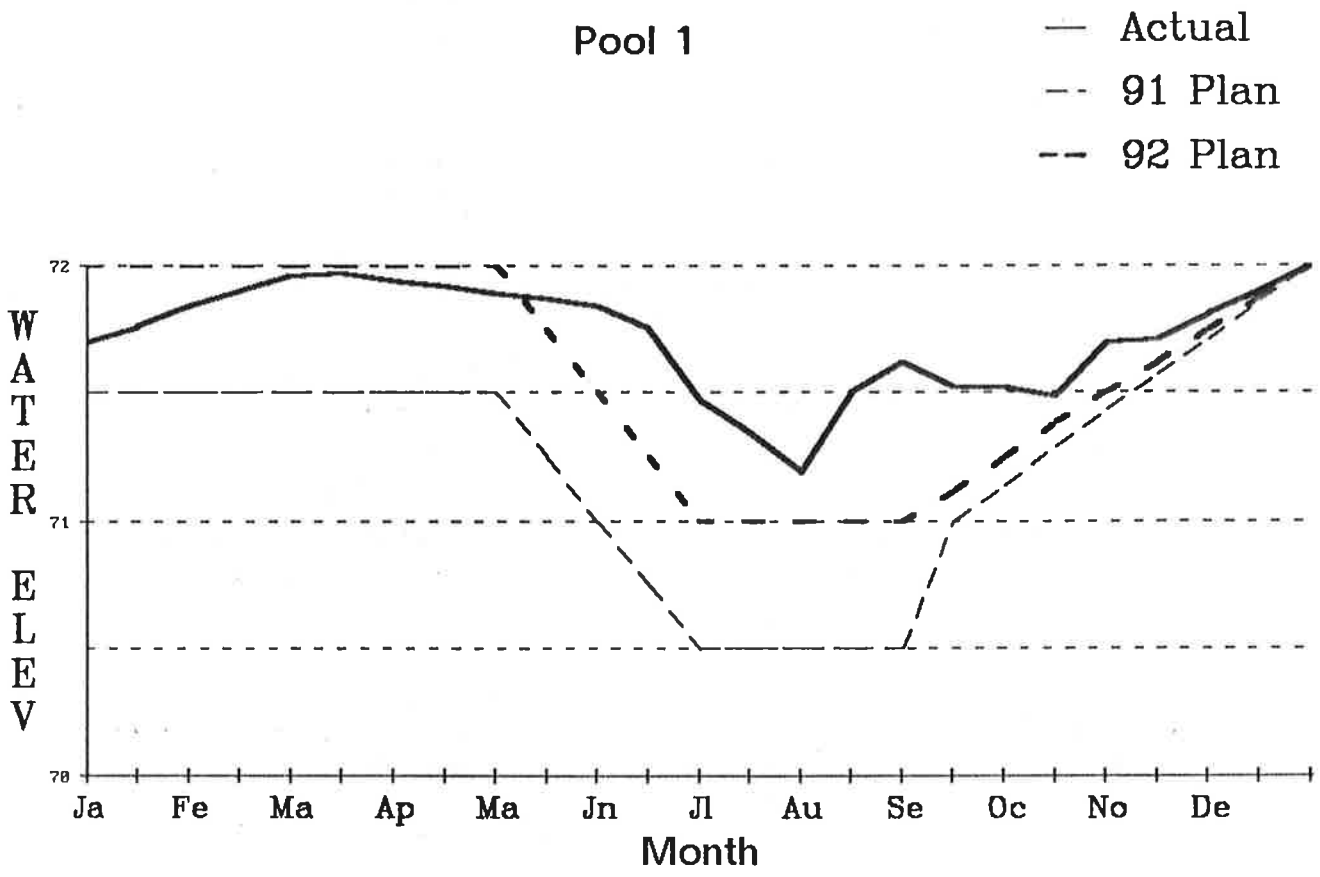
Since 1989 new pumps were put in place to enable the manager to manipulate water levels with out having to rely on gravity drainage. Units which were directly affected by installation of pumps include: Mini-Marsh, MSU 7A, MSU 8A, MSU 8B and Cedar Point Pool 1. Units indirectly influenced are Pools 2A, 2B, 2C, MSU 7B and Cedar Point pool 2. Darby units 1, 2, 3 and 4 can all be controlled by one centrally located pumping structure. The main moist soil pump at Ottawa NWR enables manipulation of MSU 3, MSU 4, and MSU 5.

During the construction season of 1991, work was completed on the Mini-Marsh dikes and work had begun on the western dike of MSU 8A and the southern dike of MSU 6. Also in 1991 MSU 5 was completely mowed due to willow infestation.

In 1992 priorities are to: 1) finish MSU 6 before spring, 2) finish dike work and ditch clean out in MSU 8A and simultaneously drain pool 2A and place a culvert and screw gate between these two units, 3) Move equipment to Darby unit and rehab dikes in pools 2, 3, and 4,) if time permits, to renovate dikes at pheasant farm (Cedar Point).

The station is in the process of writing a Wetland Management Plan. This plan should give more instruction on management for Ottawa as a whole including the major management goals such as spring migration, fall migration, brood habitat, and endangered species. The hopes are that future management will divide the refuge into core sections which will provide diverse habitat within a general area.

1. Unit Pool 1
2. Acres 275
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 570.5
5. Water Elev. with 50% bottom exposed - 569
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	30	35	30
Cattail	25	20	35
Aquatic Smartweed	10	5	5
Smartweed/Nutsedge	20	15	10
Other	5	10	10
Willow/Mallow	10	15	10

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	80,000	101,010	115,500
Geese	15,500	44,490	68,390
GBH	3,000	6,450	5,250

9. Purple Loosestrife: Plants were found in the south interior part of the pool. Plants were pulled but not sprayed. Approximately 15 plants were pulled.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were at a shallow marsh level throughout the spring. The unit had a open water area in the middle and moist soil areas in the northern section and along the western side. Gates were opened in fall to bring levels up for migration.

Results:

Submergent aquatics began to grow in the areas where water was standing. Other areas (especially the northern end) were covered with smartweed. These conditions attracted shorebirds, geese and ducks. Approximately 15 purple loosestrife plants were found in the southern end and pulled by hand. The 6 - 12 inches of water in bay areas attracted average numbers of migrating waterfowl in the fall. Peak populations in the unit reached 10,000 birds.

Facilities:

Dikes were mowed once in summer.

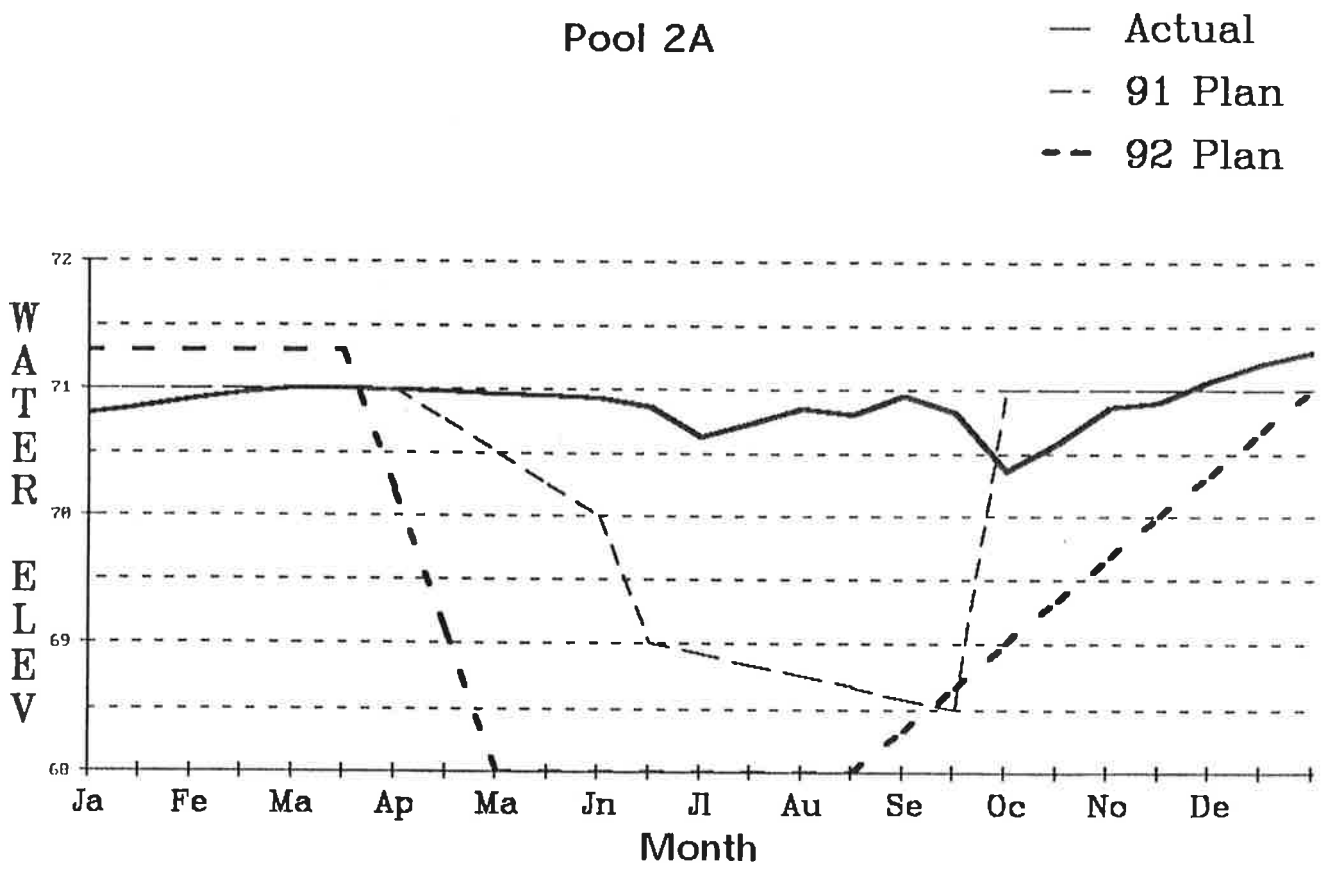
Costs:

No costs were incurred as only gravity was used to fill the pool.

B.2 Objectives of the 1992 Proposed Water Levels

Water levels will remain steady throughout winter and spring to keep this pool a permanent marsh, discouraging willow and cottonwood and encouraging normal marsh plants. Water levels will be allowed to drop due to evaporation in the summer to encourage invertebrates. Water levels should be increase in the fall for migration purposes.

1. Unit Pool 2A
2. Acres 70
3. Maximum elevation permissible 572
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 568
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	40	55	85
Mixed Forbes/Other	25	10	0
Smartweed/Velvet Leaf	5	5	5
Aquatic Smartweed	15	10	0
Mud flats/Bidens	5	0	0
Willow/Cottonwood	10	20	10

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	41,900	31,740	25,090
Geese	47,400	67,500	23,390
GBH	800	240	100

9. Purple Loosestrife: No plants were observed in this pool.

Pool 2A

A.2 Effects of Past Year's Water Levels

Levels:

Actual water levels differed slightly from planned levels during the year. Water levels in this pool are difficult to control because it only has one culvert which empties into an adjoining pool. This pool was scheduled for rehabilitation work in 1991, however, limited manpower prohibited the work to be done. So water levels were maintain at a constant level.

Results:

The pool did not hold a lot of attraction to wildlife during the year. A few smartweed plants were observed along waters edge, along with willow and cottonwood growth. The island in the middle of the pool is over grown with willow and cottonwood as well. Geese and a few ducks were observed loafing in the pool. The majority of the use occurred during the winter when open water was available in the pool.

Facilities:

The north, south and west dikes are in excellent condition. The east dike has some erosion problems at the toe.

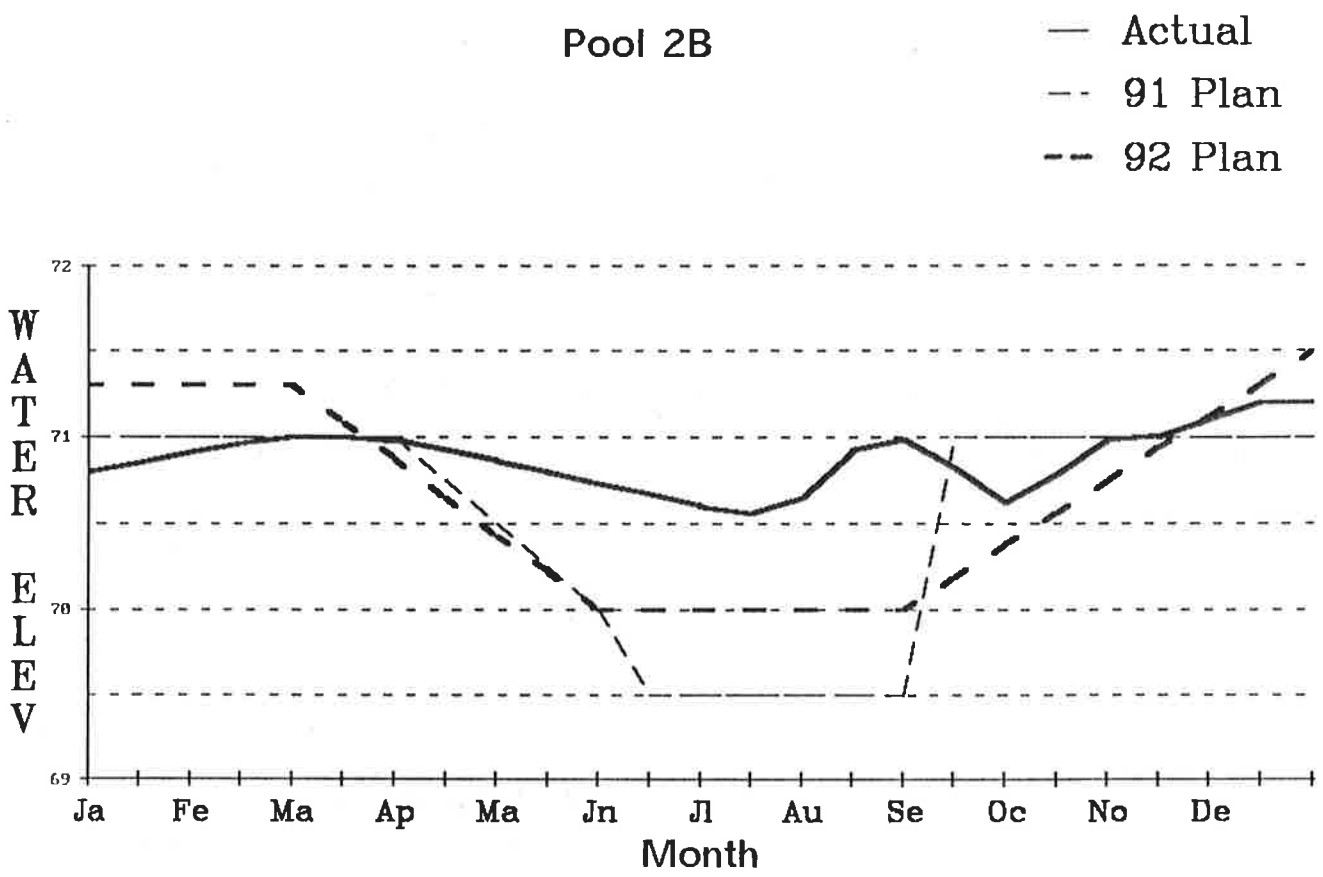
Costs:

The dikes were mowed once and the roads were graded. Purple loosestrife was not observed in this pool this year. No pumping was done in the pool.

B.2 Objectives of the 1992 Proposed Water Levels

This pool will be drawn down in late spring in conjunction with the work needed to be done in MSU 8A. The dike between the two units will be breached in order to drain the pool. A 12 inch culvert and screw gate will then be added to better manipulate pool 2A by using the pumping structure in 8A. Mowing of willow and cottonwood will take place once unit is dry. After all rehabilitation is done the unit will then be inundated slowly.

1. Unit Pool 2B
2. Acres 95
3. Maximum elevation permissible 572
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 568
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Cattail	3	3	3
Willow/Cottonwood	10	17	20
Smartweed/Millet	35	0	10
Open Water/Cottonwood Seed	10	20	30
Smartweed/Cottonwood Seed	10	40	10
Bidens/Milkweed/Other	10	0	5
Submerged aquatics	20	20	20
American Lotus	2	1	1

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	45,000	36,090	93,240
Geese	37,800	73,170	55,150
GBH	1,400	930	850

9. Purple Loosestrife: No loosestrife visible.

A.2 Effects of Past Year's Water Levels

Levels:

This pool was at a shallow marsh stage during the year. Water levels were kept at a relatively stable level. The pool was lowered through evaporation and then slightly increased in the fall.

Results:

Stands of aquatic smartweed developed in the pool. One clump of cattail was evident. Submerged aquatics continued to develop in the entire pool as evident from use by wigeon and gadwall in the fall. Cottonwood seedlings continue to grow especially at the east end of the pool.

Facilities:

Dikes were mowed once this past summer.

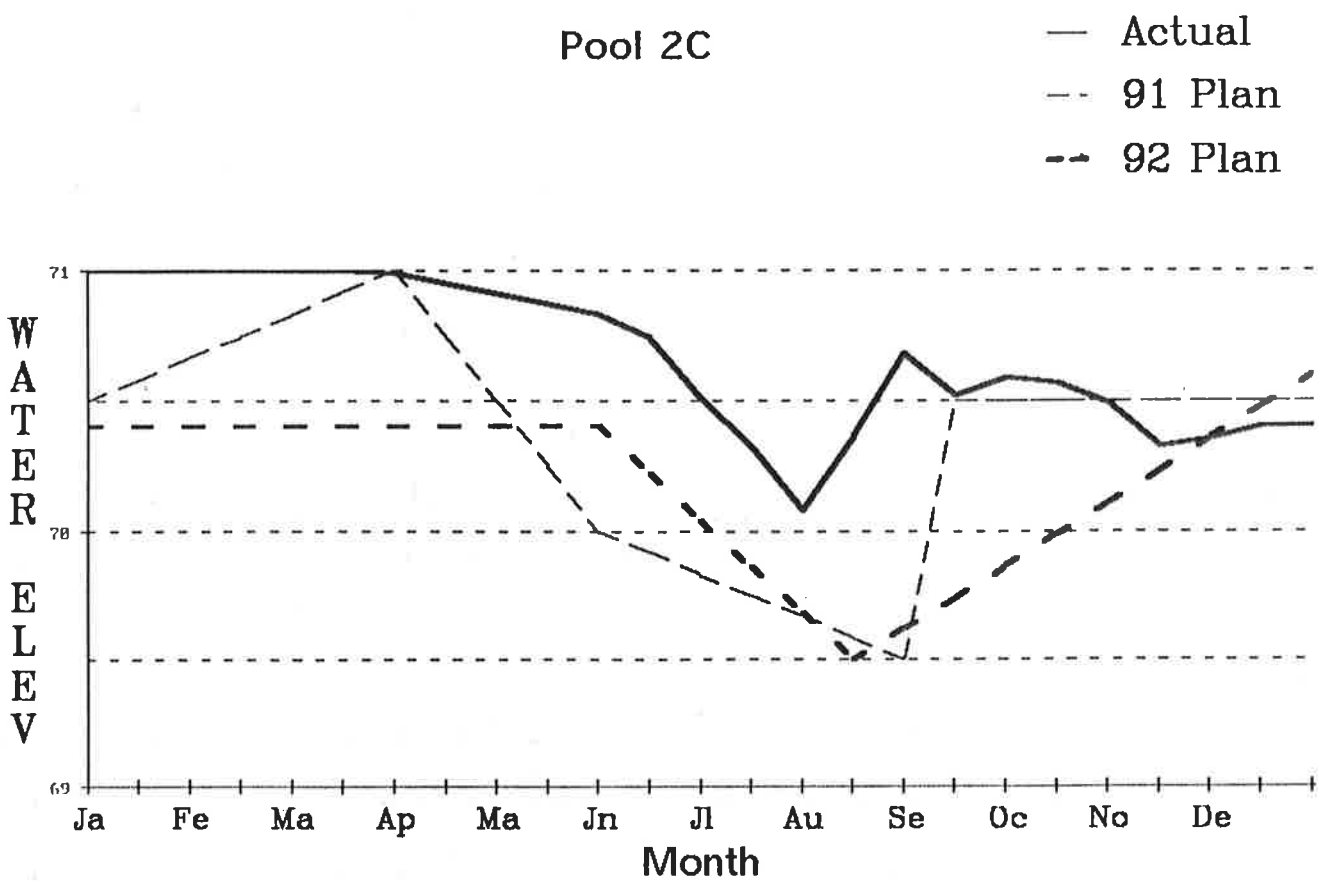
Costs:

No costs occurred this year.

B.2 Objectives of the 1992 Proposed Water Levels

This pool will be managed as a semi-permanent marsh and waters kept somewhat high because 8A and 2A will be dry in the summer. Water levels will be lowered slightly during the growing season through evaporation to encourage submergent and emergent vegetation growth.

1. Unit Pool 2C
2. Acres 80
3. Maximum elevation permissible 571
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 569
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Aquatic Smartweed	2	5	25
Smartweed	10	35	10
Millet/Other	25	3	15
Open Water/Submergents	40	16	25
Cattail	20	16	5
American Lotus	3	5	10
Mud flats	0	20	10

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	49,900	66,720	116,280
Geese	45,000	29,190	111,520
GBH	2,000	1,920	2,230

9. Purple Loosestrife: Four plants were pulled.

A.2 Effects of Past Year's Water Levels

Levels:

Water was allowed to evaporate through the summer exposing mud flats in August. Water levels were than increased slightly in fall.

Results:

This pool had a variety of emergents, moist soil plants, and a few submergents. Lotus continues to encroach into the middle of the pool. This was a favorable area for shorebirds and waterfowl during the fall.

Facilities:

The dikes surrounding the unit were mowed several times because the refuge's public use trails go around the unit. Also the south dike received an observation platform overlooking the pool.

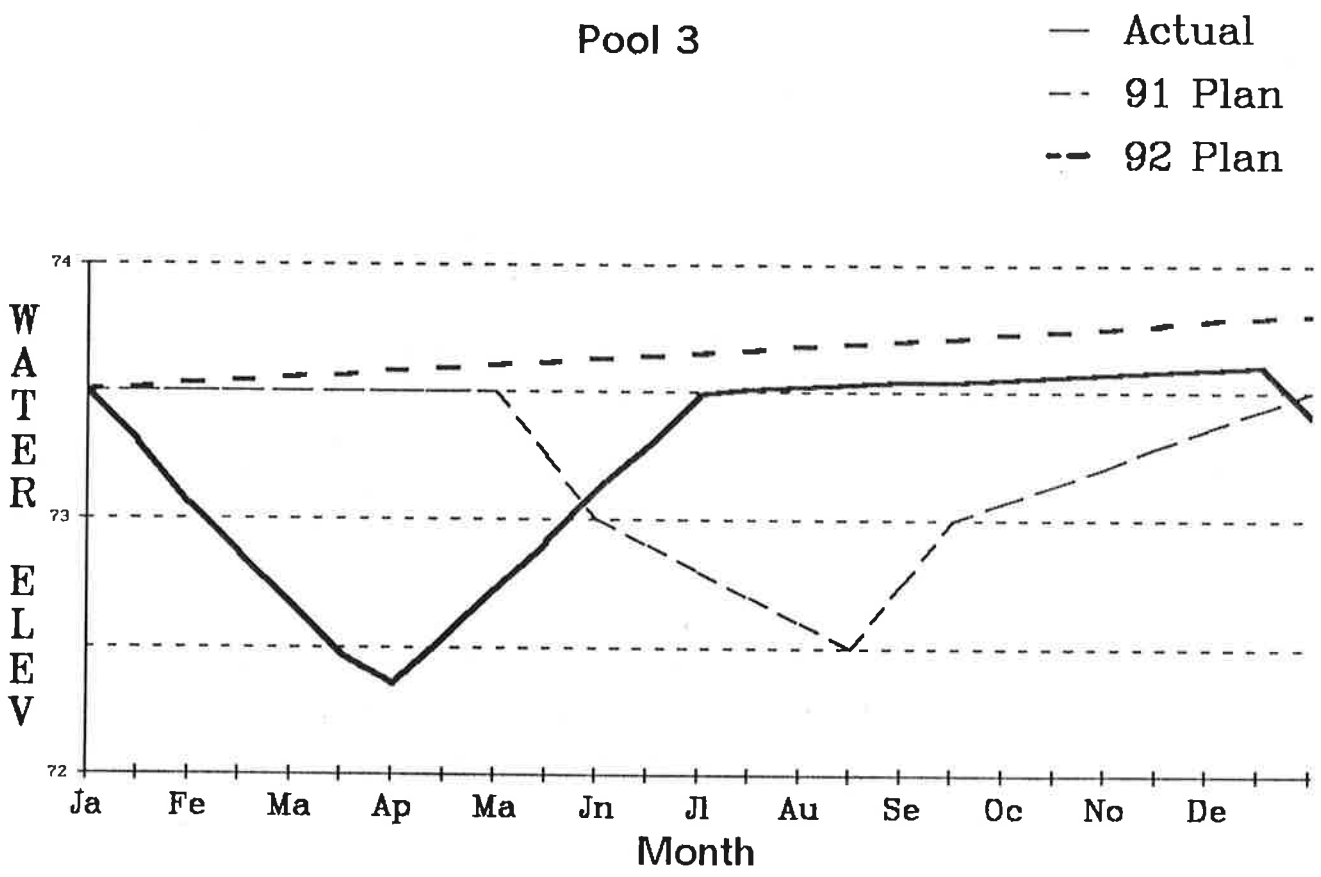
Costs:

No costs occurred this year.

B.2 Objectives of the 1992 Proposed Water Levels

Pull down water levels slightly in early summer then allow water to evaporate through the summer to encourage emergents. Make mud flats available in the fall for migrating shorebirds then bring water levels up for migrating waterfowl.

1. Unit Pool 3
2. Acres 260
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - 570.5



7. Vegetation:

Species	%1989	%1990	%1991
Open Water/Mud Flats	50	40	50
Wooded	12	16	16
Cattail	12	23	29
Smartweed/Millet	15	18	2
Annual Smartweed	1	0	0
Submergents	10	3	3

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	120,800	212,340	150,000
Geese	51,000	113,310	74,260
GBH	2,800	3,570	3,160

9. Purple Loosestrife: Infestation along north dike. Approximately 200 plants were sprayed with two gallons of 1% Rodeo solution.

A.2 Effects of Past Year's Water Levels

Levels:

Gates were opened in April to offset water loss. Gates then remained opened for the rest of the year to offset water loss to evaporation. Low water levels in Lake Erie prevented moving water in the fall to bring gauge reading up to 74.00 so that cattail in the western third would be inundated.

Results:

The pool was in a shallow marsh stage for most of the year. After the summer evaporation the unit was mostly mud flats where the water once was. In the fall the gate was opened to allow gravity to fill the pool. The east end of the pool was used heavily by geese and ducks during fall migration as a loafing area. One mute swan used the unit for the duration of the summer. West end of the unit is still choked with cattail and brush.

Facilities:

Construction on the south dike was completed in 1990. A new water control structure was placed along the south dike in 1989. Impoundment dikes were mowed once this year.

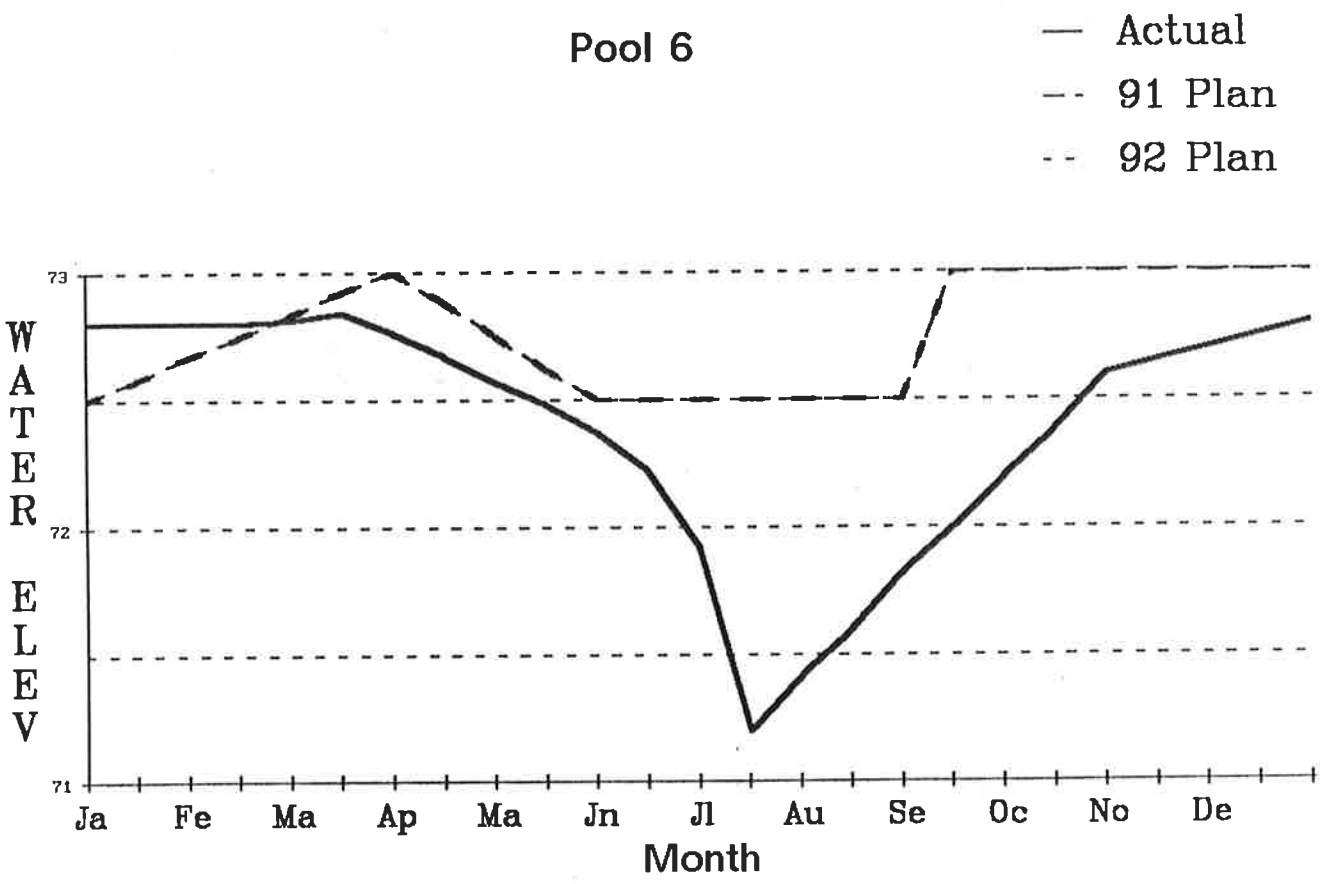
Costs:

Only cost occurred this year were associated with purple loosestrife spraying (see previous page).

B.2 Objectives of the 1992 Proposed Water Levels

Water levels need to be high in the west end to open up cattail and brush and low on the east end to encourage such growth. Unfortunately, this is impossible without a dividing dike and this should be considered in the future. For now, we can only try to maintain a steady water level at 74.00 to allow for cattail infested area to be inundated throughout the summer. This may require use of Crisafulli pump if Lake Erie water levels continue to remain low.

1. Unit Pool 6 (Woodies Roost)
2. Acres 160
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	40	40	40
Wooded	10	10	10
Cattail	35	40	40
Smartweed/Millet	10	5	5
Aquatic Smartweed	5	5	5

8. Wildlife Use:

	Use Days 1989	1990	1991
Ducks	5,500	14,250	24,480
Geese	5,800	7,620	11,620
GBH	1,500	720	640

9. Purple Loosestrife: No plants observed.

A.2 Effects of Past Year's Water Levels

Levels:

The pool fluctuated along with lake levels and evaporation rates.

Results:

Areas of dense cattail are still present. Area has limited use by geese, ducks, and herons. Muskrat dike damage continues to be a problem.

Facilities:

East and south dikes are no longer capable of retaining water. Both dikes are severely eroded in areas and are riddled with muskrat/woodchuck holes. The north half of the east dike is overgrown with sumac and dogwood and is barely wide enough to ride an ATV on. The north dike also has some erosion and muskrat hole problems.

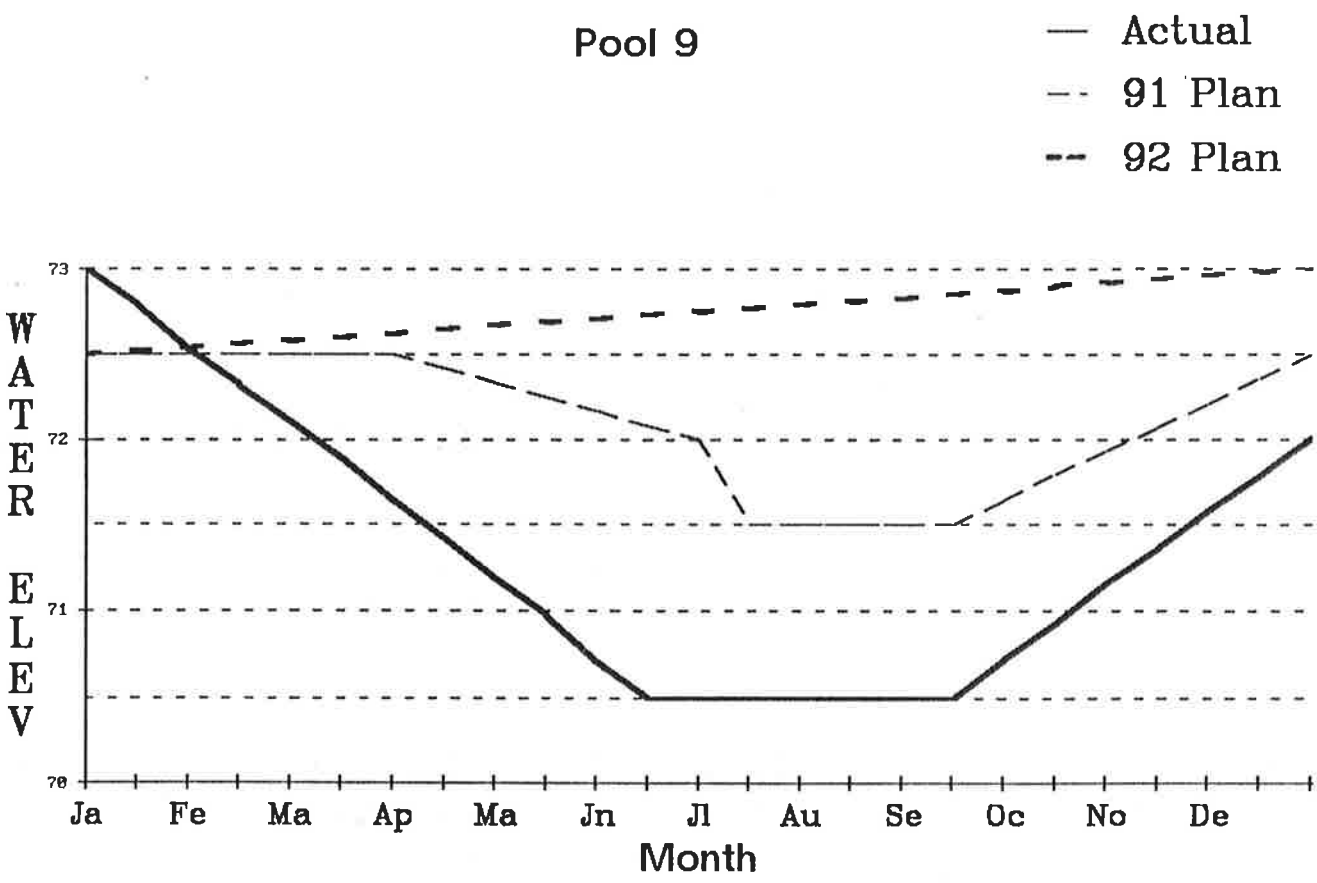
Costs:

None incurred.

B.2 Objectives of the 1992 Proposed Water Levels

Maintain current levels. The pool should hold water if the ODNR does not lower their adjacent unit. This unit is scheduled for renovations in the near future. The 1992 and 1991 planned levels are the same.

1. Unit Pool 9
2. Acres _____
3. Maximum elevation permissible _____
4. Flowline elevation of lowest structure _____
5. Water Elev. with 50% bottom exposed - _____
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Cattail		76	80
Phragmites		10	10
Open water		4	0
Smartweed/mud flat		3	1
Cottonwood/willow		7	5
Reed Canary Grass			4

8. Wildlife Use:

	Use Days 1989	1990	1991
Ducks		7,320	1,200
Geese		810	200
GBH		810	150

9. Purple Loosestrife: No purple loosestrife seen.

A.2 Effects of Past Year's Water Levels

Levels:

Unit was allowed to become completely dry by mid-summer. In the fall water was pumped into the unit using a Crisafulli pump. The pool could not be filled by gravity due to low water levels in Lake Erie. Graph is only figurative because a water gauge has not been installed.

Results:

The unit is almost a solid stand of cattail with some reed canary grass and phragmites. A 20 acre area was disked in fall just prior to pumping of water in hopes that some of the area will open up for next year. This pool had limited use by waterfowl.

Facilities:

The north dike is eroded and riddled with muskrat/woodchuck holes and covered with trees and brush. It is scheduled for reconstruction along with Metzger's Marsh according to the North American Plan, St. Lawrence Project. The west dike also has some holes and brush on it. The south dike was reconstructed in the Tank Ditch contract in 1989. A water gauge is needed to better record yearly manipulations.

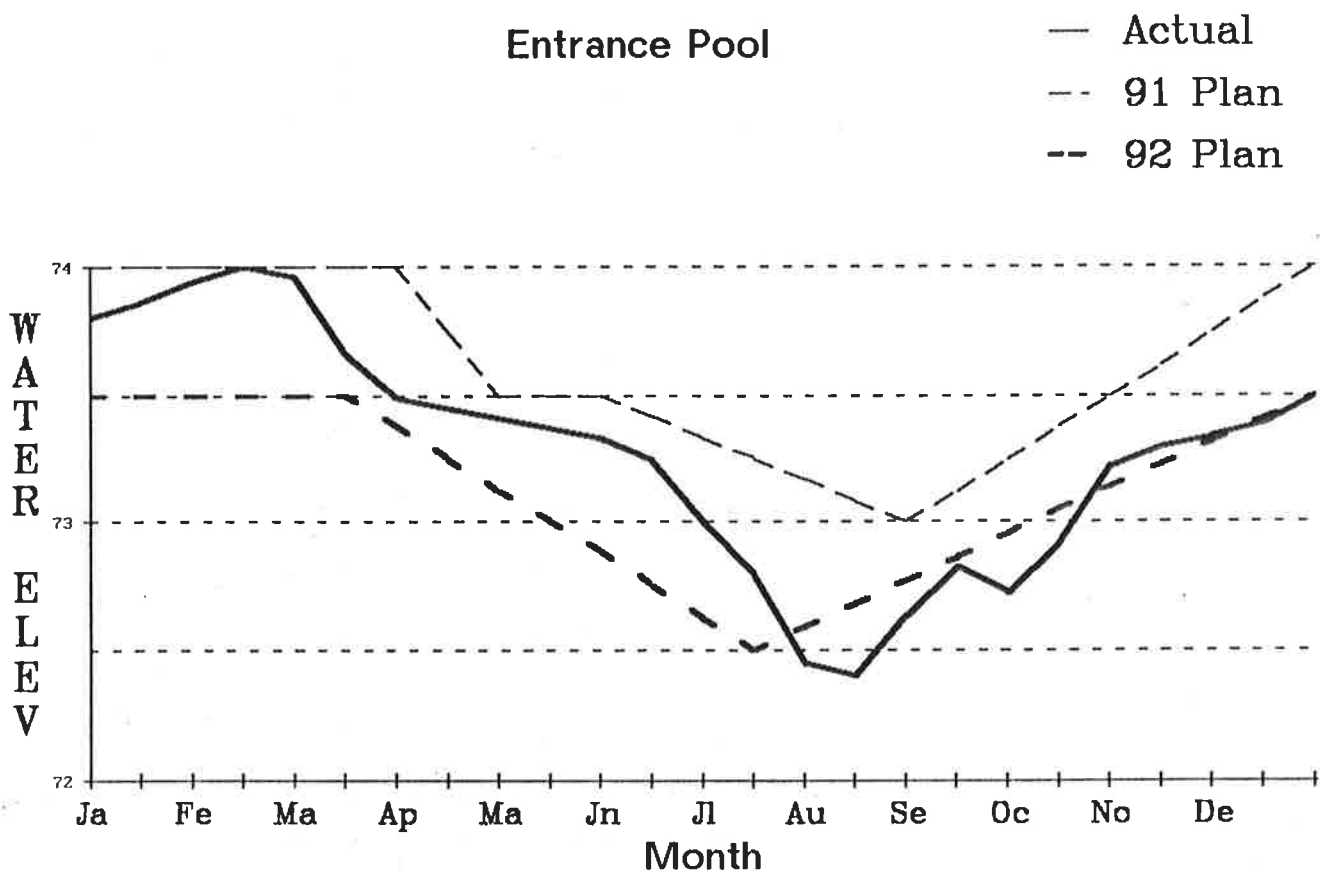
Costs:

Costs were incurred when pumping with the Crisafulli pump in the fall. Over the span of two weeks about 40 hours of tractor time was logged while pumping.

B.2 Objectives of the 1992 Proposed Water Levels

Once again the water should be kept as high as possible to discourage cattail. The area that was disked will provide a start on opening the area up if water is maintained high enough, although we expect cattail to grow back in this area but not as dense. If time permits the north dike should be renovated.

1. Unit Entrance Pool
2. Acres 30
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	10	20	33
Cattail	15	20	20
Wet Meadow	20	15	15
Smartweed	10	5	2
Willow/Brush	12	15	5
Upland	33	25	25

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	5,600	34,620	61,200
Geese	6,500	31,110	47,630
GBH	1,300	1,200	5,350

9. Purple Loosestrife: A few plants were pulled by hand.

Entrance Pool

A.2 Effects of Past Year's Water Levels

Levels:

Water was kept at a shallow marsh level. Water was lost through evaporation during the summer and then replaced in fall.

Results:

The pool had cattail around the south and east borders. The pool was used extensively by ducks in the spring and by great blue herons, great egrets and pied-billed grebes during the spring and summer. Up to 200 herons could be seen feeding in the mornings. Remains of willow and cottonwood sprayed with Rodeo in 1990 still persist. The pool was divided into two youth trapping units due to the high number of muskrat houses.

Facilities:

The north dike is in perfect shape after completion of the construction in 1990. A water level gauge was installed after construction was completed.

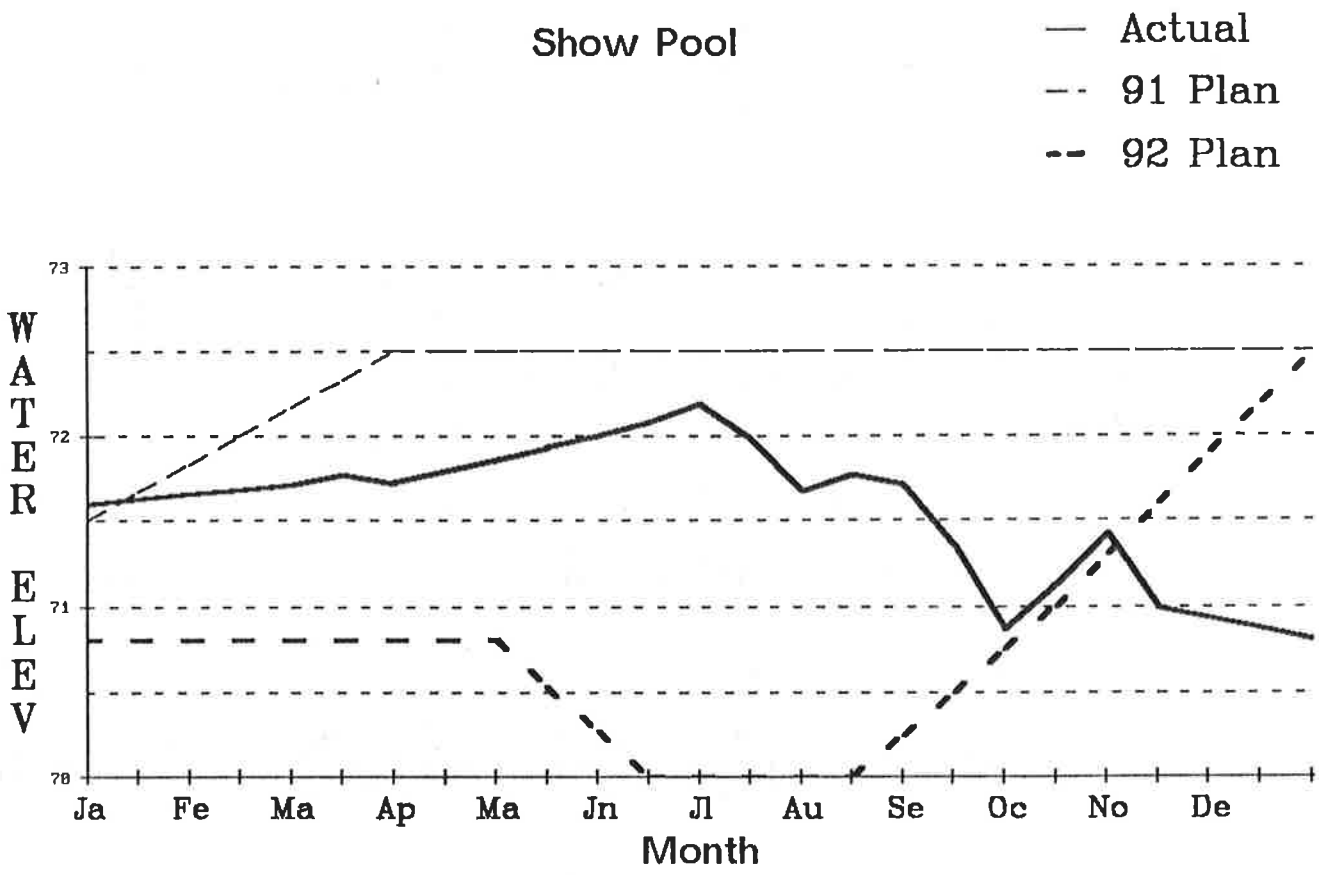
Costs:

Low water levels in Lake Erie prevented water to gravity feed into the unit. A new 6 inch diesel pump was used to move water into the unit. About 60 hours were put on the pump during the fall.

B.2 Objectives of the 1992 Proposed Water Levels

The unit should be kept at a normal marsh stage with a slight draw down in the summer to encourage cattail and other emergents and to help prevent willow and cottonwood from invading again.

1. Unit Show Pool
2. Acres 30
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 572
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	35	35	25
Cattail/Bulrush	15	20	15
Wet Meadow/Smartweed	10	15	10
Cottonwood/uplands	15	15	35
Submergents	10	5	5
Phragmites	15	10	10

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	2,500	1,560	650
Geese	8,200	7,980	5,620
GBH	1,100	330	720

9. Purple Loosestrife: Plants throughout the pool. Spotty all over with concentrations along the south interior dike and east edges. Fifty gallons of a 1% Rodeo solution was used. Solution was applied with the use of the airboat.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels slowly decreased during summer mainly due to evaporation. There is also a slow leak in the south dike. Low water levels in Lake Erie prevented gravity feed into the pool. Water levels were brought up in fall by using a 6 inch diesel pump.

Results:

This pool has an island/remnant dike in the middle which most times is a moist meadow. The open water areas are devoid of any vegetative growth. Cattail and phragmites predominate with sections of loosestrife. Some smartweeds grew amongst the cattail. Limited use by ducks, geese and great blue herons occurred.

Facilities:

The north and east dikes were totally redone in 1988-89. The south dike leaks into the wooded area around the shop and office. There are currently no plans for repair.

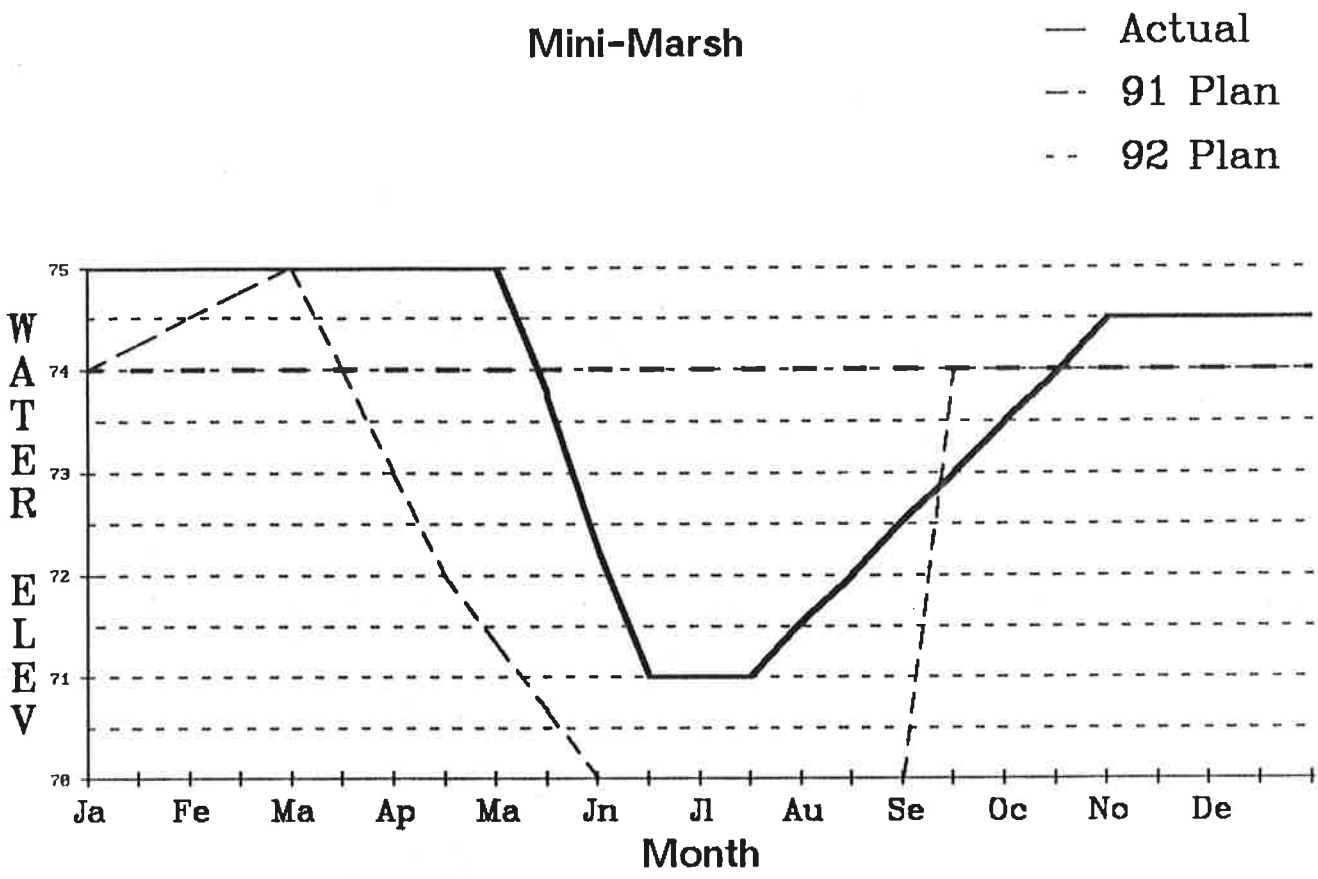
Costs:

Approximately 30 hours were put on a 6 inch diesel pump. Other costs that were incurred are associated with purple loosestrife control.

B.2 Objectives of the 1992 Proposed Water Levels

This pool is scheduled for renovation this year, however, this is not a high priority. If time and personnel are available, the unit should be drained, mowed and disked (if needed) then water slowly added to encourage vegetative regrowth. Otherwise try to maintain a high water level to discourage anymore encroachment by undesirable plants.

1. Unit Mini-Marsh
2. Acres 16
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 571
5. Water Elev. with 50% bottom exposed - 570.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	15	30	30
Cattail	40	25	25
Other	30	10	10
Dead Cattail (Submergents)	5	0	0
Smartweed/Millet	10	25	5
Cottonwood/Willow		10	30

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	1,000	1,020	1,630
Geese	1,200	1,950	2,910
GBH	800	150	200

9. Purple Loosestrife: None Noted.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were maintained for a deep marsh. Unit was drained for construction purposes and then water was pumped in and kept at a deep marsh area to choke out undesirable plants. Level readings on the graph are only figurative because a water gauge has not been installed.

Results:

Cattails dominated the pool along with open water after the pool was flooded. Unit received limited use by waterfowl and herons during low water levels.

Facilities:

The north and east dikes were repaired in 1990. The same dikes were reshaped this year and filter fabric and rip-rap laid on the interior side. The above dikes are scheduled for seeding in the spring of this year and also, if time permits, a pipe from the pumping structure will be added so that water can be pumped directly into Crane Creek. Currently water is moved through a small ditch that circles the unit and then dumps into Lindsey-Limestone ditch.

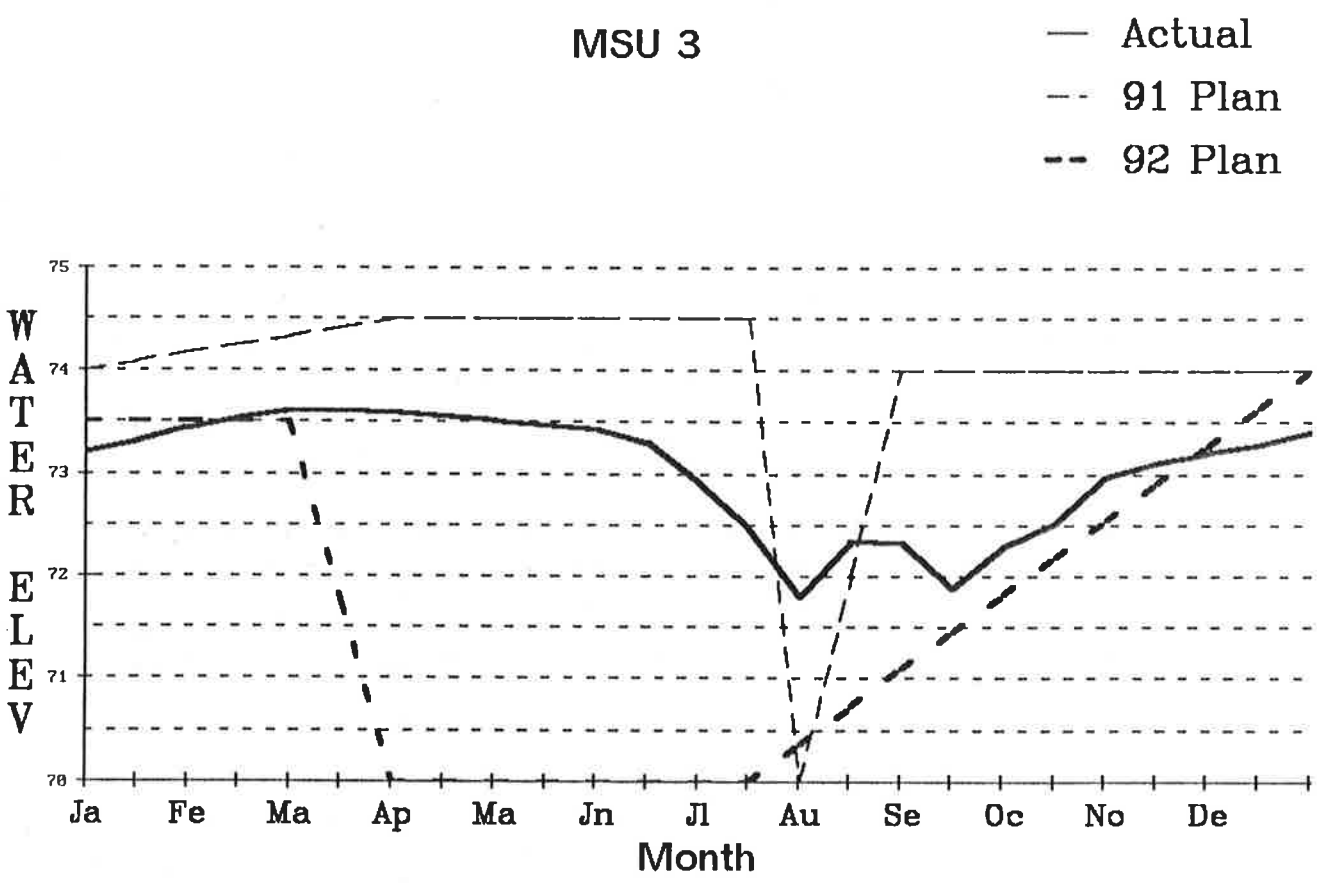
Costs:

Filter fabric and rip-rap. Electricity for pumping totalled $515.45.

B.2 Objectives of 1992 Proposed Water Levels

This unit will be managed as a permanent wetland for 1992 to stress undesirable plants that have encroached into the unit. This unit is located west of units 2A and 8A, which will be under construction this year, hence Mini-Marsh will provide loafing areas on this part of the refuge. A water level gauge is needed to accurately record response to water level manipulation.

1. Unit MSU 3
2. Acres 213
3. Maximum elevation permissible 574.5
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Emergents	63	7	5
Open Water	2	2	5
Smartweed/Millet	10	6	5
Bidens/Cottonwood	15	40	40
Wet Meadow	10	5	5
Uplands		40	40

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	32,000	21,120	16,720
Geese	55,000	3,630	2,830
GBH	1,000	1,470	850

9. Purple Loosestrife: None observed.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were allowed to decrease through the course of the summer. Water was pumped into the unit in fall during filling of MSU 5.

Results:

Low water levels encouraged upland species including willow, cottonwood, etc. Reed canary grass and sedges were present on the north side where a small pocket of water persisted outside of the burrow area. Lack of water in the spring, summer and fall decreased duck and goose use on the area.

Facilities:

Placement of water control structure, filter fabric, rip-rap and topsoil was completed in 1989. The ditch that feeds water into the unit via the moist soil pump needs to be reshaped and rip-rapped.

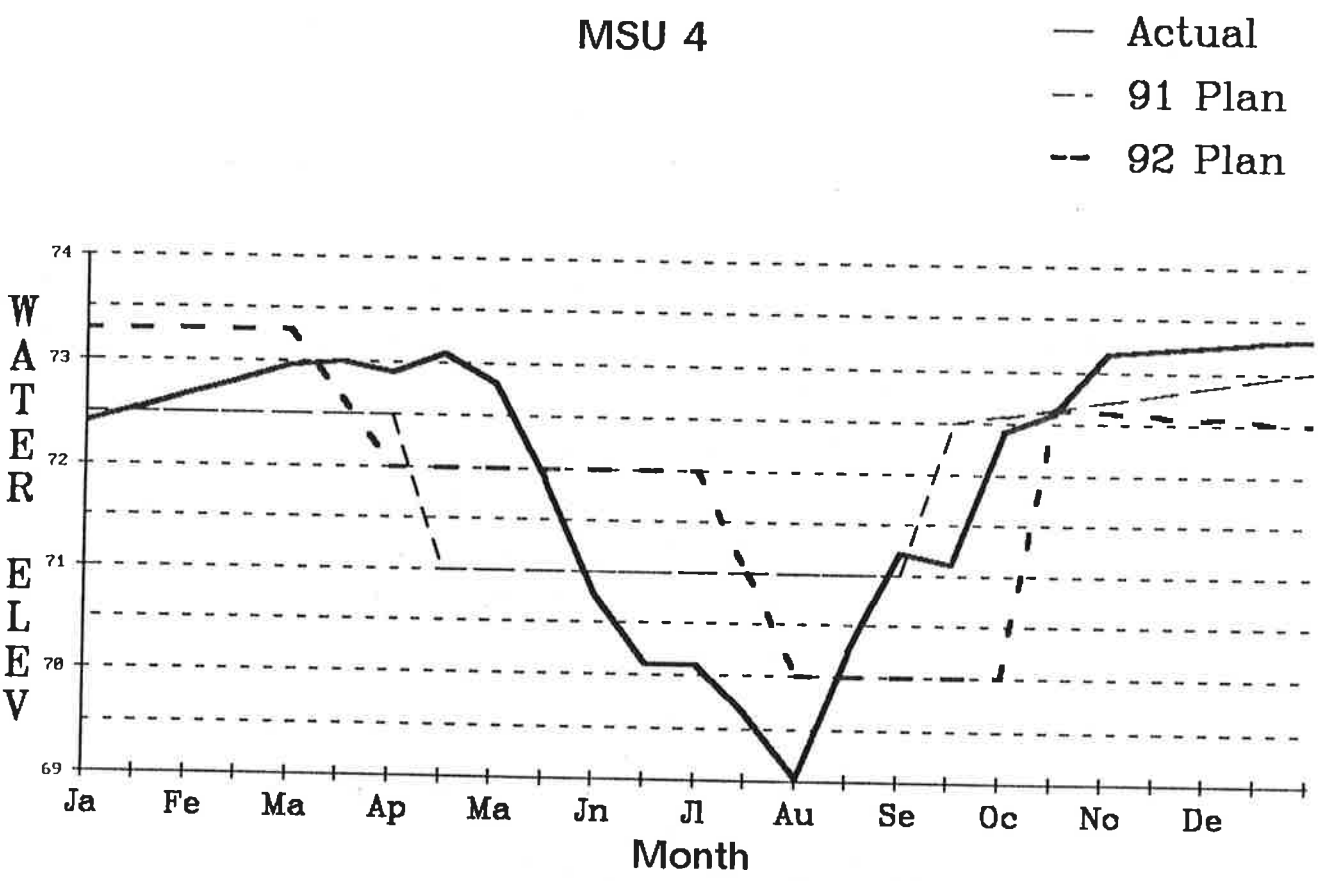
Costs:

Pumping costs (approximately $300.00) were incurred along with filling of other units.

B.2 Objectives of the 1992 Proposed Water Levels

This unit is a high priority for renovation work in 1992. The water will be drawn down before construction season begins to ensure the area is dry for mowing, disking etc.. After all work is completed the unit will be inundated slowly to encourage some late season moist soil plants.

1. Unit MSU 4
2. Acres 106
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Reed Canary grass/Willow	20	10	20
Millet/Bidens/Smartweed	15	10	60
Agriculture	5	0	0
Borrow	5	5	5
Upland	55	0	0
Planted Millet/Buckwheat		30	0
Planted Wheat		45	0

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	3,000	31,170	248,000
Geese	4,000	33,990	32,230
GBH	200	960	850

9. Purple Loosestrife: None noted.

A.2 Effects of Past Year's Water Levels

Levels:

Water was lowered in late spring then allowed to evaporate through summer. Water was added in the fall to allow the unit to be utilized by migrating waterfowl.

Results:

The impoundment produced a bumper crop of millet and smartweeds. Duck use during fall migration was astounding. Up to 10,000 birds were seen feeding during the mornings. Overall this was the best food producing impoundment this year.

Facilities:

Dikes and water control structures are in good shape.

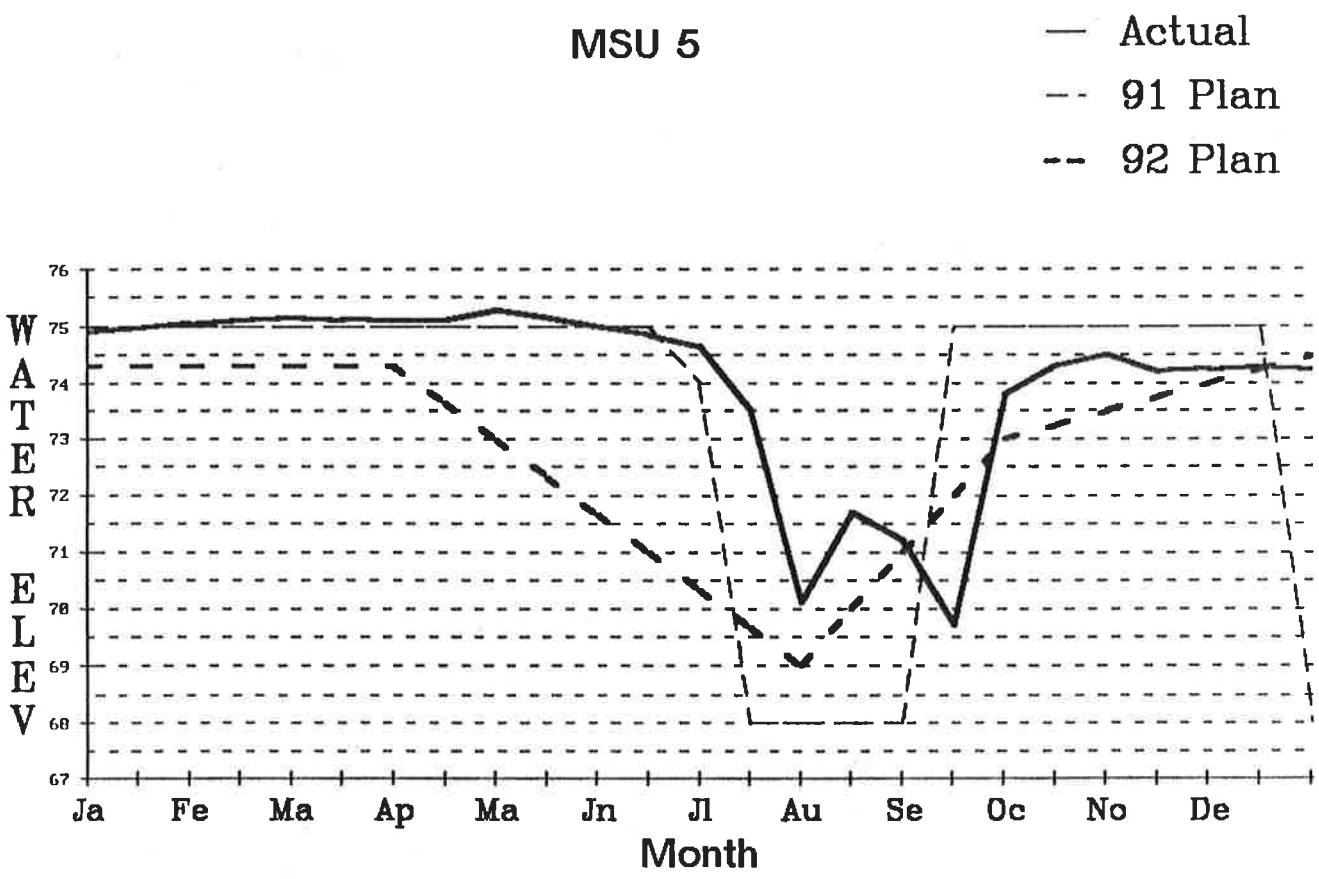
Costs:

Pumping cost were approximately $ 1,369.52.

B.2 Objectives of the 1992 Proposed Water Levels

Water level will be lowered slightly in early spring to provide shallow water (1-3 inches) for spring shorebird migration. Water levels will decrease due to summer evaporation. Water will then be pumped in fall for migrating waterfowl.

1. Unit MSU 5
2. Acres 250
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 570.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Millet/Smartweed	40	5	10
Agriculture	0	0	0
Bidens	10	0	5
Cattail/Reed Canary grass	5	15	15
Cottonwood/Willow	40	50	50
Velvet Leaf	5	0	0
Open Water			20

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	10,000	121,020	212,160
Geese	20,000	87,390	143,590
GBH	400	3,240	4,230

9. Purple Loosestrife: Five plants along Tank Ditch were sprayed with a 1% Rodeo solution.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept high due to the infestation of willow. In July, the unit was dried so that the willow could be mowed. The unit was then reflooded quickly because a swim-in duck trap, for the black duck physioecology study, is located in this unit.

Results:

The majority of the unit was mowed due to the willow infestation. After the unit was reflooded ducks and geese utilized this unit extensively for feeding and loafing. Small plants of smartweeds and millets sprouted after the mowing took place. Unit was not drained in the winter because of the amount of use it was receiving as a feeding and loafing area for swans. Swan numbers peaked at 200 birds.

Facilities:

Facilities are in good shape, after the dike/road between MSU 4/5 was graveled this past winter.

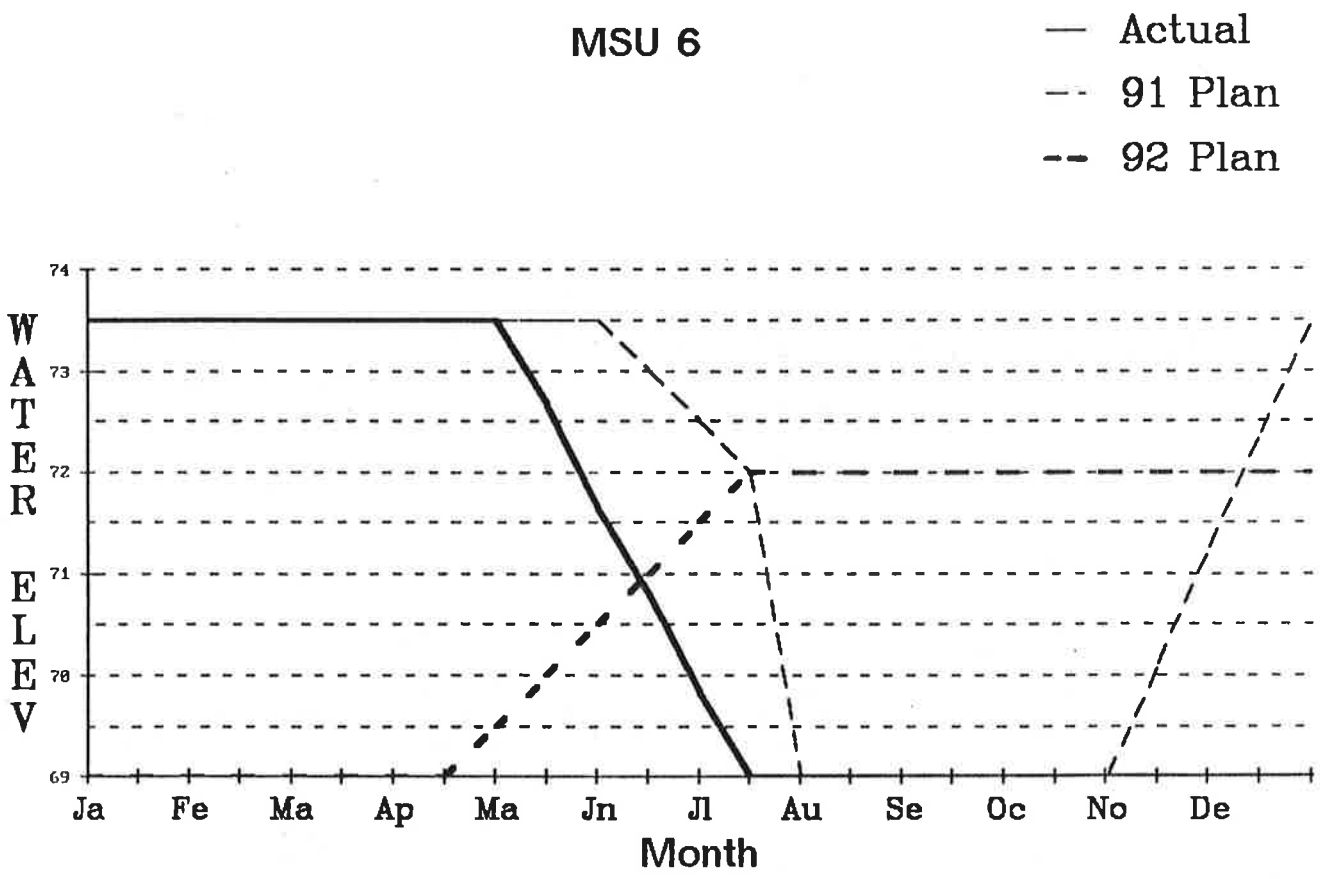
Costs:

One-hundred and five hours were put on a tractor in order to mow the entire unit. The willow was so thick through most of the unit that the lowest possible gear was used to get through these thickets. Electricity for pumping totalled $ 2,150.00.

B.2 Objectives of the 1992 Proposed Water Levels

Water levels will be kept steady through early spring then the unit will go through a gradual draw down to achieve production of millet and smartweeds. This will also allow for the unit to be close to dry during mid-summer incase anymore mechanical manipulations are needed to control willow etc.. The unit then will be inundated slowly for migrating waterfowl and to allow the swim in duck trap to be functional by early October.

1. Unit MSU 6
2. Acres 70
3. Maximum elevation permissible varies with lake
4. Flowline elevation of lowest structure None
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed -



7. Vegetation:

Species	%1989	%1990	%1991
Cottonwood/Willow	35	35	45
Wet Meadow	5	5	0
Cattail	50	55	55
Other	5	0	0
Smartweed/Millet	5	3	0
Open Water	0	2	0

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	2,800	30	500
Geese	1,800	0	200
GBH	500	150	360

9. Purple Loosestrife: None noted.

A.2 Effects of Past Year's Water Levels

Levels:

The unit fluctuated according to the amount of precipitation received. Usually water levels will fluctuate with the Lake Erie levels due to a breached in the dike along the south side, however, lake levels were to low for this to happen. Water levels are figurative because a water gauge has not been installed.

Results:

Cattail is dominate with willow, cottonwood and phragmites expanding into the area. Waterfowl use was essentially nil this year.

Facilities:

Construction of a new dike along the south side of the unit was started in the fall of 1991 and will be completed by spring. Minor extension of inlet/outlet culverts to the moist soil pump is all that's needed to provide active water level control. A water gauge is needed to accurately record the units progress.

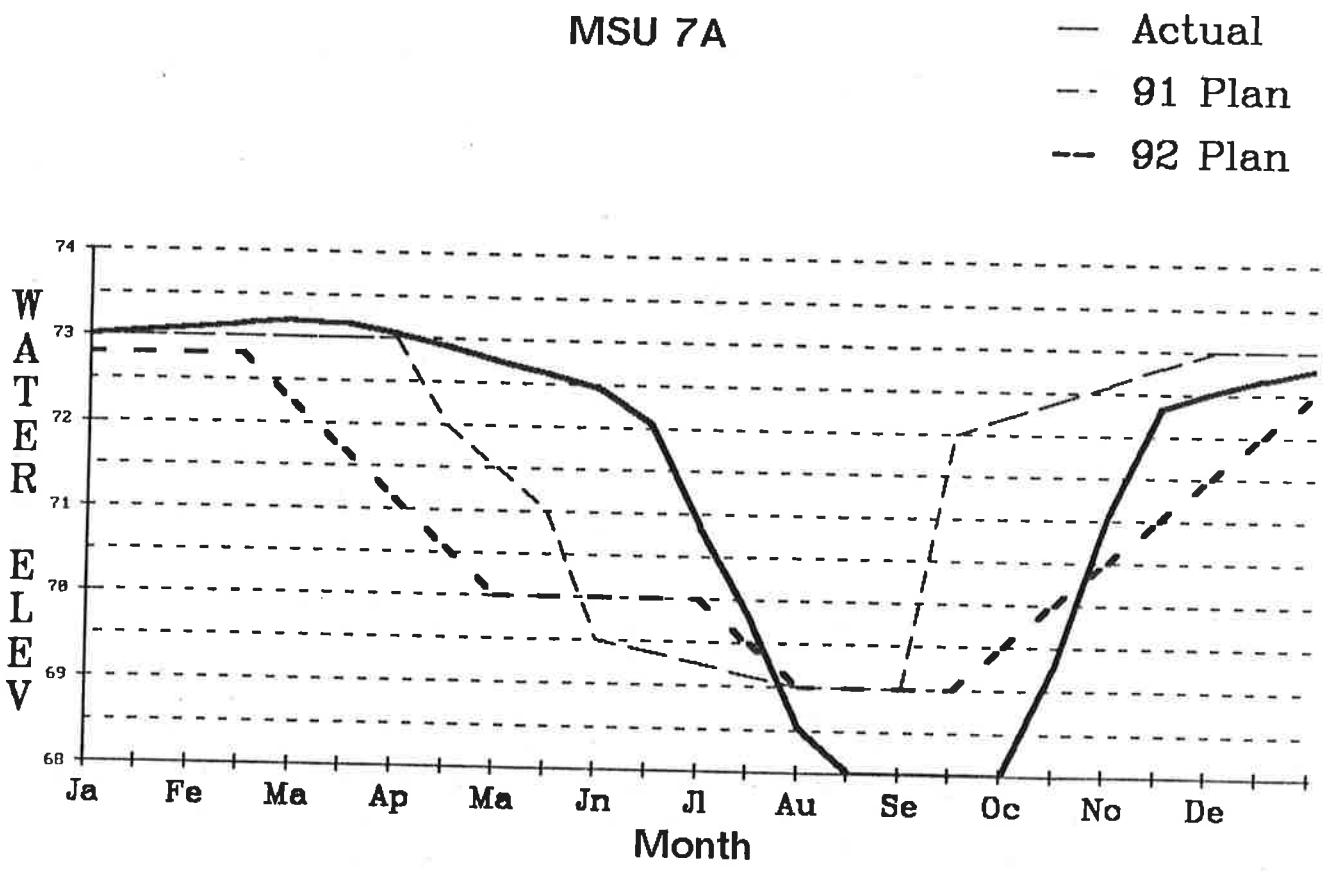
Costs:

Costs were incurred during the building of the south dike. Both the new John Deere 750 dozer and the Caterpillar excavator are being used on this project.

B.2 Objectives of the 1992 Proposed Water Levels

After completion of the south dike and an extension is added to the moist soil pump the unit will be flooded to a high water stage to stress undesirable brush species and to open up areas in the cattail by increasing wildlife use, especially muskrats.

1. Unit MSU 7A
2. Acres 49
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 570.5
5. Water Elev. with 50% bottom exposed - 572.0
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Upland Species	35	0	30
Cattail	5	0	0
Millet	10	0	0
Bidens	20	0	10
Smartweed	15	18	10
Cottonwood/willow	15	2	5
Planted Millet/Buckwheat		47	0
Planted Wheat/Upland Grass		33	45

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	12,000	240	15,400
Geese	8,000	6,420	29,290
GBH	350	360	220

9. Purple Loosestrife: None observed.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept steady through spring and into the summer. Then the unit was drained for reshaping of the northern dike.

Results:

Upland plant species were predominate in this unit along with a scattering of moist soil plants. Ducks and geese were attracted to the area of grass that was mowed around the hunting blind.

Facilities:

The north dike was reconstructed in 1990. A new pump station was installed in 1989. The dike between MSU 7A and 7B needs to be reshaped.

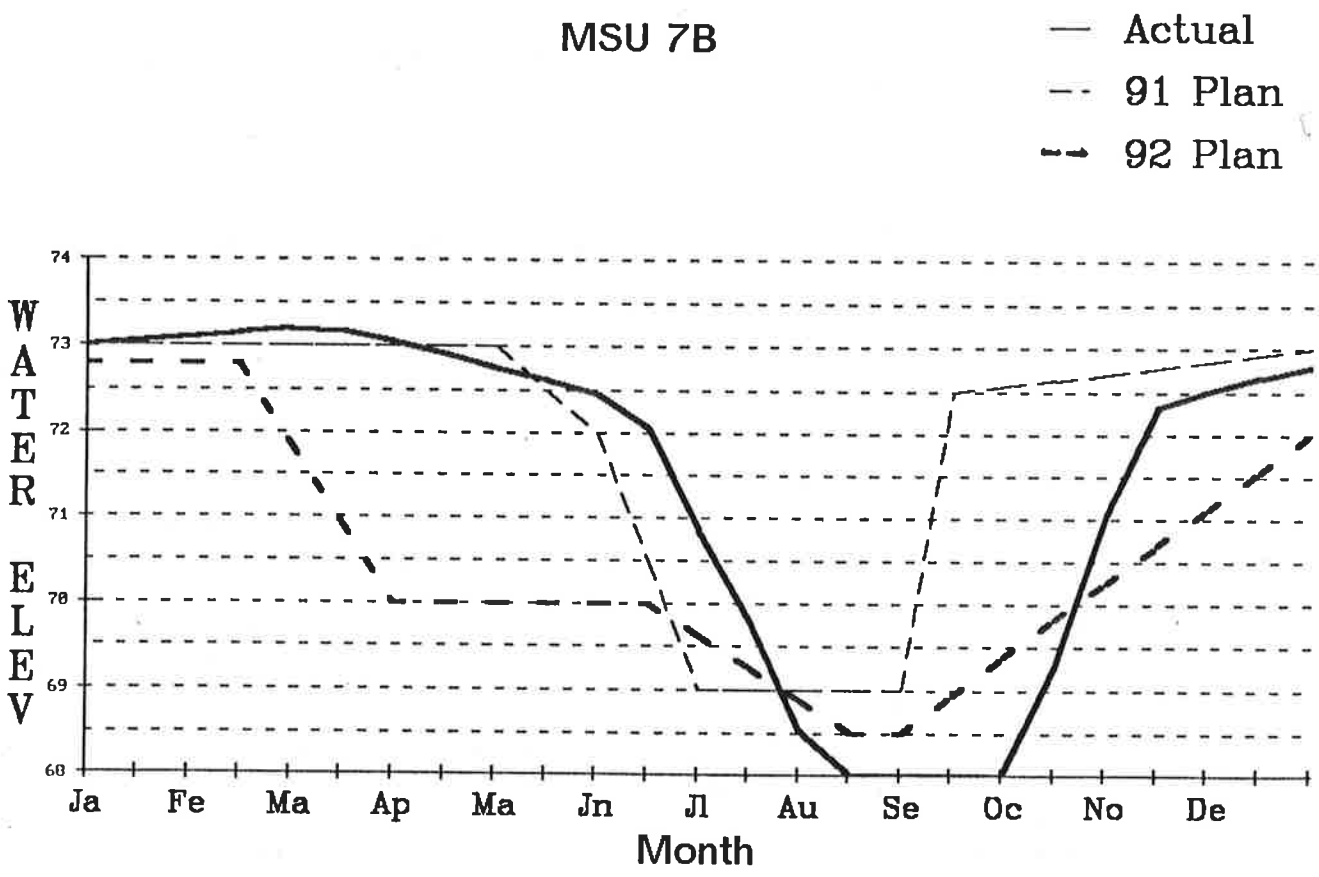
Costs:

Electricity cost for pumping was $553.51. Area surrounding the hunting blind was mowed by State personnel.

B.2 Objectives of the 1992 Proposed Water Levels

Water level should be dropped slightly in spring to provide habitat for migrating shorebirds. Then the impoundment should be dewatered if needed for seeding of north dike, otherwise unit will be kept in moist condition to facilitate moist soil plants.

1. Unit MSU 7B
2. Acres 44
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure None
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Upland	35	12	30
Smartweed/Cattail/Water	20	1	10
Smartweed/Millet	25	6	10
Bidens	15	10	10
Plowed	0	70	0
Cottonwood/Willow	5	1	0

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	25,000	100	5,400
Geese	20,500	600	6,000
GBH	450	510	1,120

9. Purple Loosestrife: None observed.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept steady through spring and into the summer. Then unit was drained for reshaping of northern dike. Unit was reflooded when Lake Erie water levels were high enough to run the pumps.

Results:

While the unit was dry, the northern third was lightly disked. The southern third remained dry during the growing season and upland plants dominated this area. The unit did not develop any dominate stands of moist soil plants, however, the plants were scattered throughout the unit. After adding water to the disked area waterfowl moved into take advantage of the new food source.

Facilities:

The north dike was reconstructed in 1990 and a water control gate was placed in the north west corner. All water for this unit will now come from MSU 7A with its pump. Dike between MSU 7A and 7B needs to be reshaped in the future.

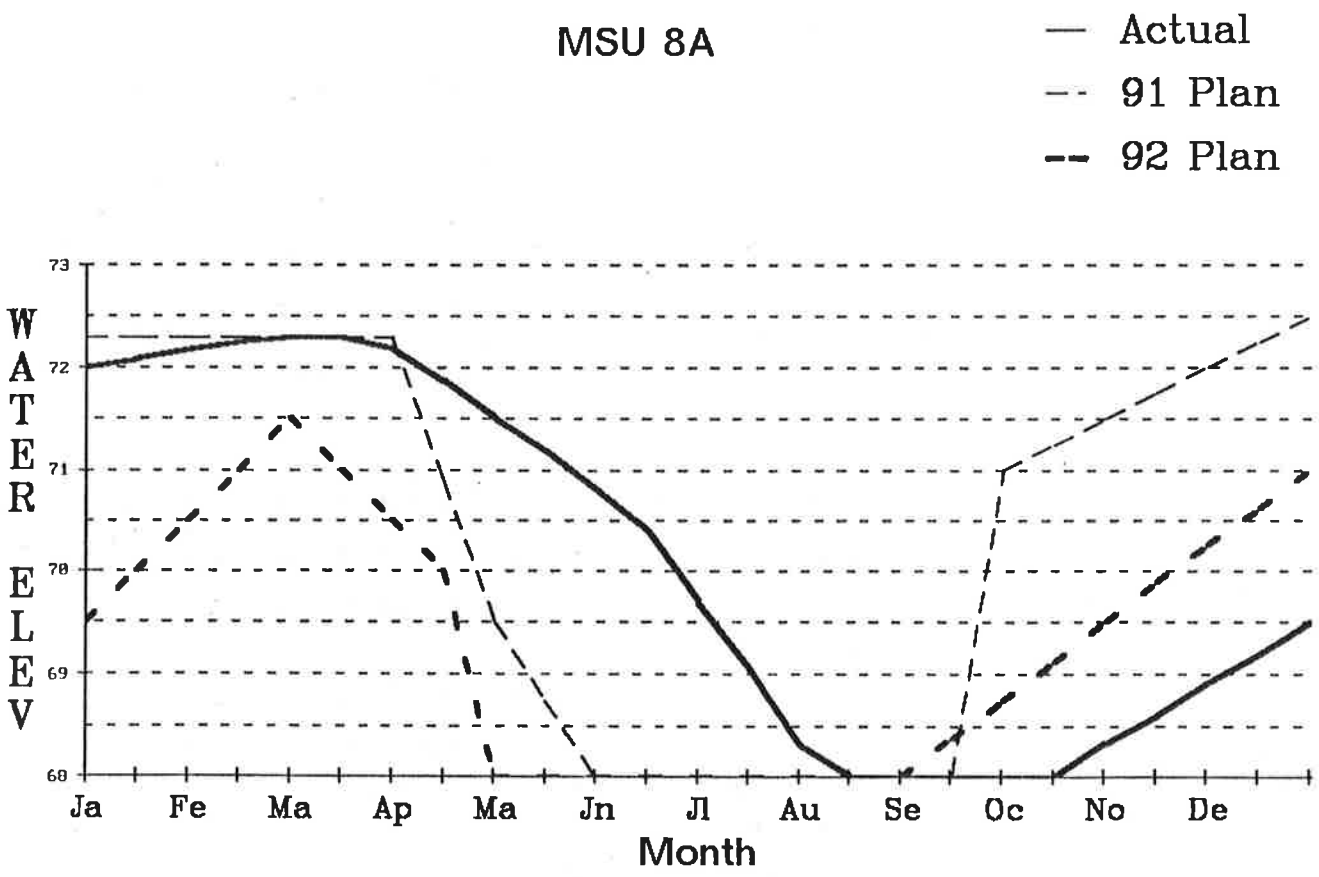
Costs:

Costs were incurred during disking parts of the unit by refuge staff.
Electricity costs for pumps totalled $200.00.

B.2 Objectives of the 1992 Water Levels

This unit will be treated similarly to Unit 7A in restoring it to a moist soil unit. The far southeast corner will remain dry, due to higher topography, as a upland for possible nesting cover.

1. Unit MSU 8A
2. Acres 44
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Millet/Smartweed (mud flats)	25	42	50
Bidens	5	5	5
Open Water	45	8	20
Upland Sup./Velvet Leaf	20	40	10
Cottonwood/Willow	5	5	15

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	36,500	14,370	80,480
Geese	12,300	24,900	68,340
GBH	2,900	750	1,070

9. Purple Loosestrife: None observed.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept steady through spring and then dropped in early summer for rehabilitation of the west dike. Then in fall unit was reflooded gradually.

Results:

This unit had a good stand of smartweeds and some millet. Willow and cottonwood were intermingled with the moist soil plants, therefore most of the unit was mowed to control these undesirables. After inundation ducks and geese utilized this unit extensively feeding on the seeds that were made available to them from mowing.

Facilities:

A pump station was constructed in the southwest corner of the unit in 1989. The western dike is currently under construction and will be completed in 1992. The ditch system is scheduled for clean up.

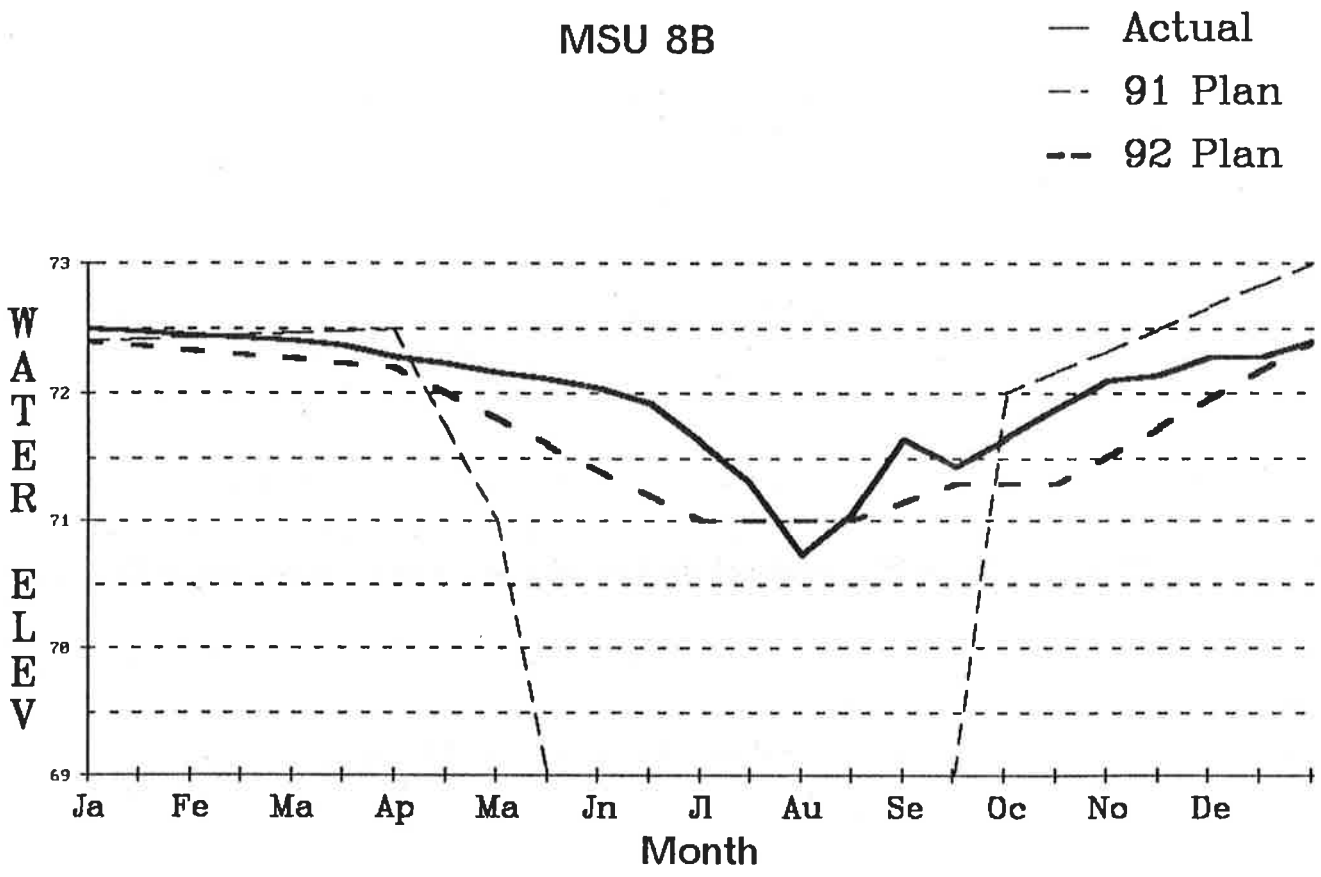
Costs:

Electricity costs for 1991 was $405.70. The John Deere 750 and Caterpillar excavator were used extensively on this project. The outside slope (Lindsey-Limestone ditch) had filter fabric and rip-rap laid on it.

B.2 Objectives of the 1992 Proposed Water Levels

Water levels will be raised slightly in early spring for migrating waterfowl and to encourage invertebrate populations. After the migrants are gone the unit will be dewatered for completion of rehab work. Afterwards, depending on when work is completed and plant response, the unit will either be slightly inundated or left dry and then flooded in the fall for migrating waterfowl.

1. Unit MSU 8B
2. Acres 85
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 571.5
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Millet (+ velvet leaf)	28	38	35
Bidens	15	0	10
Upland Species	5	10	10
Cocklebur	2	2	0
Water/Submerged Aquatics	15	5	15
Emergents (Rushes)		45	30

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	85,000	49,800	117,720
Geese	32,000	27,000	80,660
GBH	12,000	2,310	4,520

9. Purple Loosestrife: Forty plants were sprayed with a 1% Rodeo solution.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept high until June when levels were gradually decreased through evaporation. The pool was in moist soil conditions from June through August. Water was gradually added to the unit starting in August.

Results:

The water levels encouraged concentrations of millet and emergents (rushes). Shorebirds used this unit during fall migration due to the exposed mud flats. This unit had large numbers of ducks, geese, great blue herons and great egrets use after flooding in fall. Muskrat use was also high in fall.

Facilities:

In 1990 the old culvert on the south dike was replaced with a new one which allows flooding from a high point and the water moves to the low areas. The opposite of this would be flooding by backing water up from the low area. The west and south dike are in need of repairs due to muskrat and woodchuck burrowing, however, this is not a priority for this year and the unit can be managed effectively in its current condition.

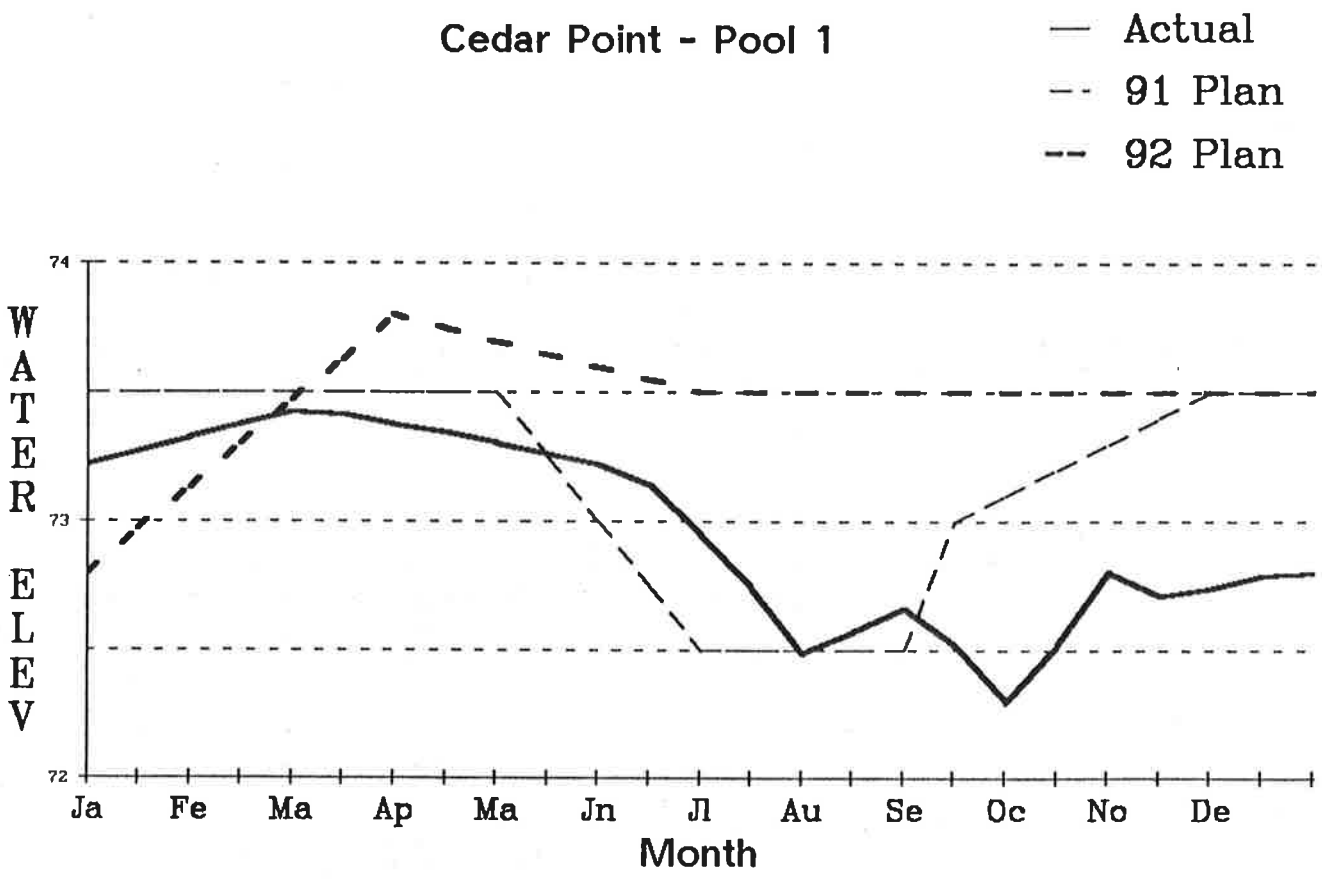
Cost:

The electricity for the pump was $ 441.94 which included draining of the woods to the west and the surrounding ditches as well as the pumping of Unit 8B.

B.2 Objectives of the 1992 Proposed Water Levels

This unit will be managed the same as last year, with a slight draw down in early spring and then allow water to evaporate during the summer. The unit will be kept somewhat moist through the summer. This unit should provide habitat for migrating shorebirds in both the spring and fall.

1. Unit Cedar Point - Pool 1
2. Acres 1,460
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	25	15	15
Water Lily	3	3	3
Cattail	30	30	60
Burreed/Bulrush	5	25	10
Other	10	2	2
Smartweed/Millets/Nutsedge	10	15	5
Phragmites/Purple Loosestrife	17	15	5

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	589,000	1,211,280	874,810
Geese	96,300	77,640	144,825
GBH	25,600	6,990	5,090

9. Purple Loosestrife: Twenty acres was sprayed with a 5% Rodeo solution by the State using a helicopter.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels decreased throughout the year because the pumps could not replace water loss due to evaporation. The low water levels in Lake Erie prevented the pumps from running for any length of time.

Results:

Small patches of wild rice were found in the unit. Cattail continues to be the predominate vegetation. Loosestrife and phragmites seem to have remained constant.

Facilities:

A majority of the road system needs grading and gravel except along drainage canal where roads were redone along with construction. A new pump structure was installed in Pool 1 by early 1990. Dikes were mowed once.

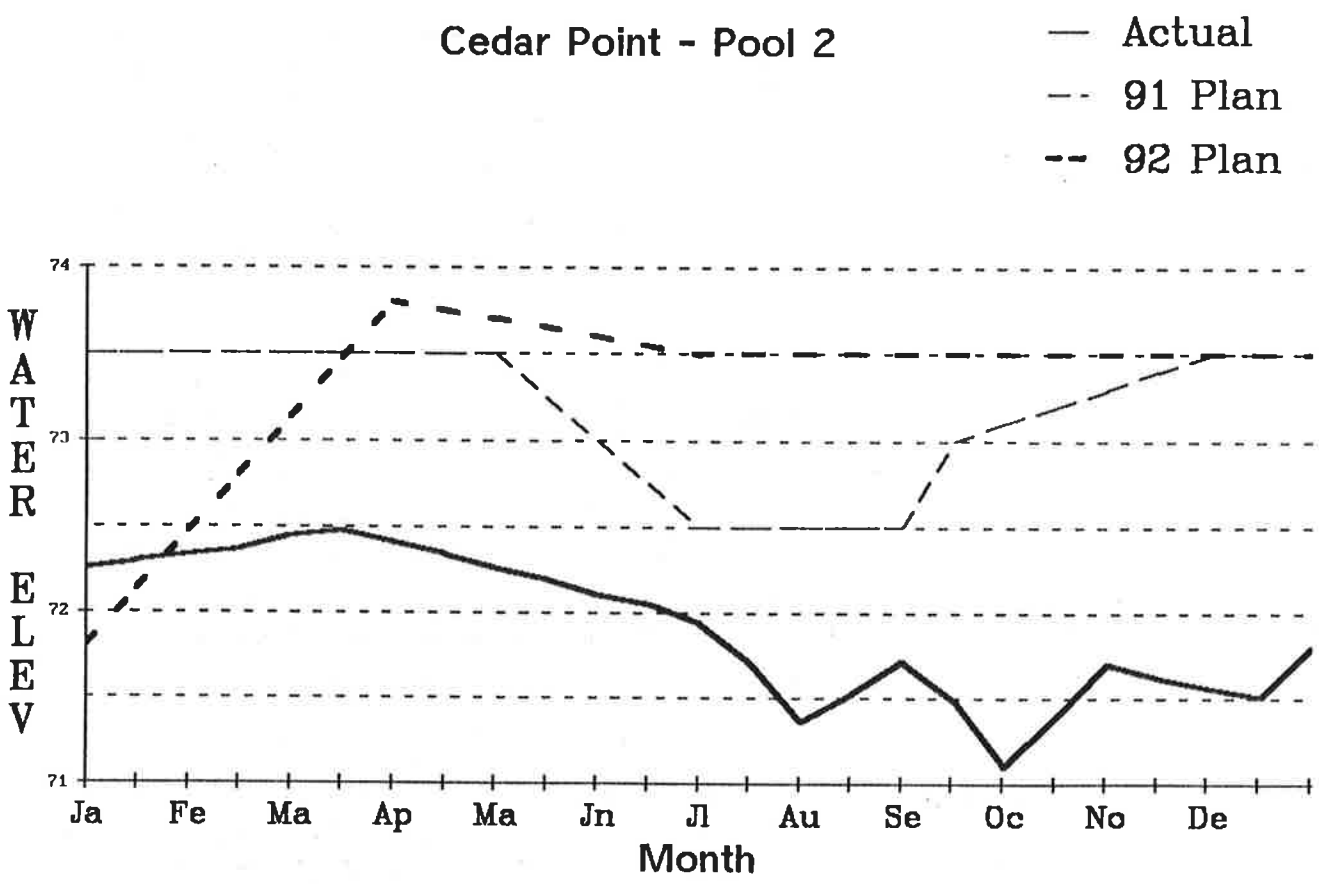
Costs:

All the dikes were mowed once. Costs for purple loosestrife was from purchase of Rodeo herbicide, the State aerially sprayed the unit free of charge. Electricity costs for the pump was approximately $ 6,000.00.

B.2 Objectives of 1992 Proposed Water Levels

Water levels should be fairly high (74.00) in the spring to offset summer evaporation. This will lessen pumping costs during the summer to maintain the water levels at around 73.50. The high water levels will encourage emergents and submergents and discourage purple loosestrife and hopefully open up holes in the dense cattail from wildlife use.

1. Unit Cedar Point - Pool 2
2. Acres 135
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water (submergent &barrow)	5	13	20
Cattail	28	37	45
Bulrush	5	2	5
Burreed	2	0	0
Phragmites/Willow	10	15	10
Smartweed/Millet/Nutsedge	20	10	20
Cottonwood/Willow	30	23	10

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	117,100	23,760	18,040
Geese	13,500	1,050	4,500
GBH	6,500	1,020	1,000

9. Purple Loosestrife: Single plants scattered throughout the unit.

A.2 Effects of Past Year's Water Levels

Levels:

Pool 2 water levels are directly connected with Pool 1 through a water control structure. Water levels remained moderate to low.

Results:

Cottonwood seedlings, phragmites, purple loosestrife and cattail dominate this pool. Very little waterfowl use occurred.

Facilities:

The main water control structure connected directly to Lake Erie has been silted in for years. The elevation difference between Pool 1 & 2 makes it difficult to add water to Pool 2 from that direction. The north and east dikes are in good condition.

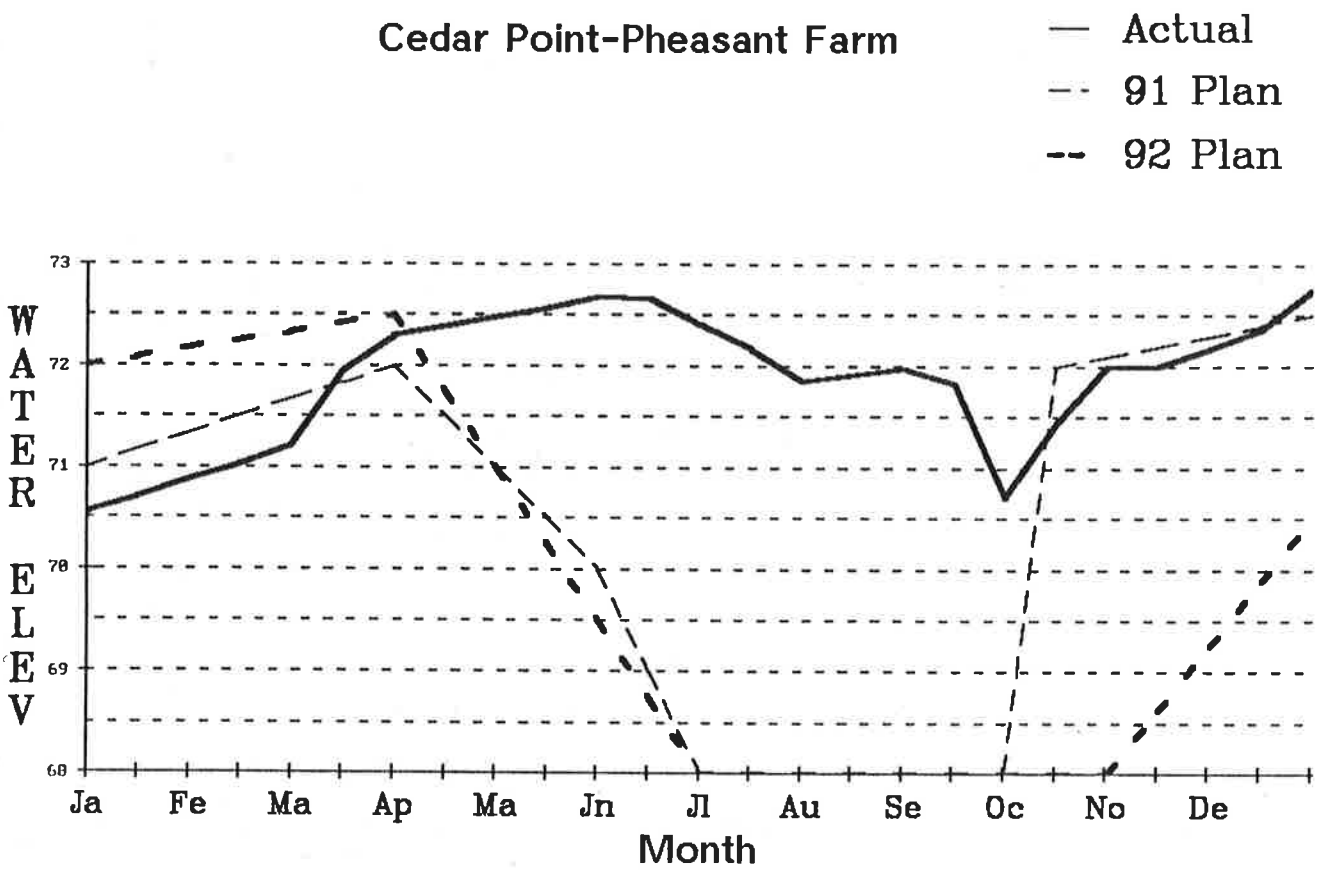
Costs:

Dikes were mowed once.

B.2 Objectives of 1992 Proposed Water Levels

This unit will be managed the same as pool 1. Water levels should be fairly high (74.00) in the spring to offset summer evaporation. This will lessen pumping costs during the summer to maintain the water levels. The high water levels will encourage emergents and submergents and discourage purple loosestrife.

1. Unit Cedar Point - Pheasant Farm
2. Acres 155
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 571
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Cattail	40	36	40
Open Water (submerg.aquatics)	10	15	10
Burreed/Arrowhead	5	5	5
Smartweed/Millet	10	5	5
Other (Purple Loosestrife)	35	25	25
Open Water (barrow pits)	0	14	15

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	71,905	15,810	9,019
Geese	4,100	26,940	1,540
GBH	2,500	1,500	890

9. Purple Loosestrife: Large patches throughout. Some spots are becoming a homogenous stand of loosestrife. Rodeo was used in a 5% solution by helicopter to cover 5 acres (50 gallons solution).

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were allowed to fluctuate with environmental conditions for two reasons: 1) this unit was initially scheduled for renovation work and 2) water is gravity fed from Lake Erie and Lake Erie water levels were to low to move water into the unit.

Results:

Purple loosestrife continues to be a problem in this pool. Little duck use was observed in the area. The entire pool is dominated by cattail with loosestrife also in abundance. A small amount of waterfowl used this pool.

Facilities:

The dikes of this unit are in poor condition. Banks of the west and east dikes severely eroded. The south and north dikes are eroded on the interior side only. The dike around the water control structure has eroded somewhat.

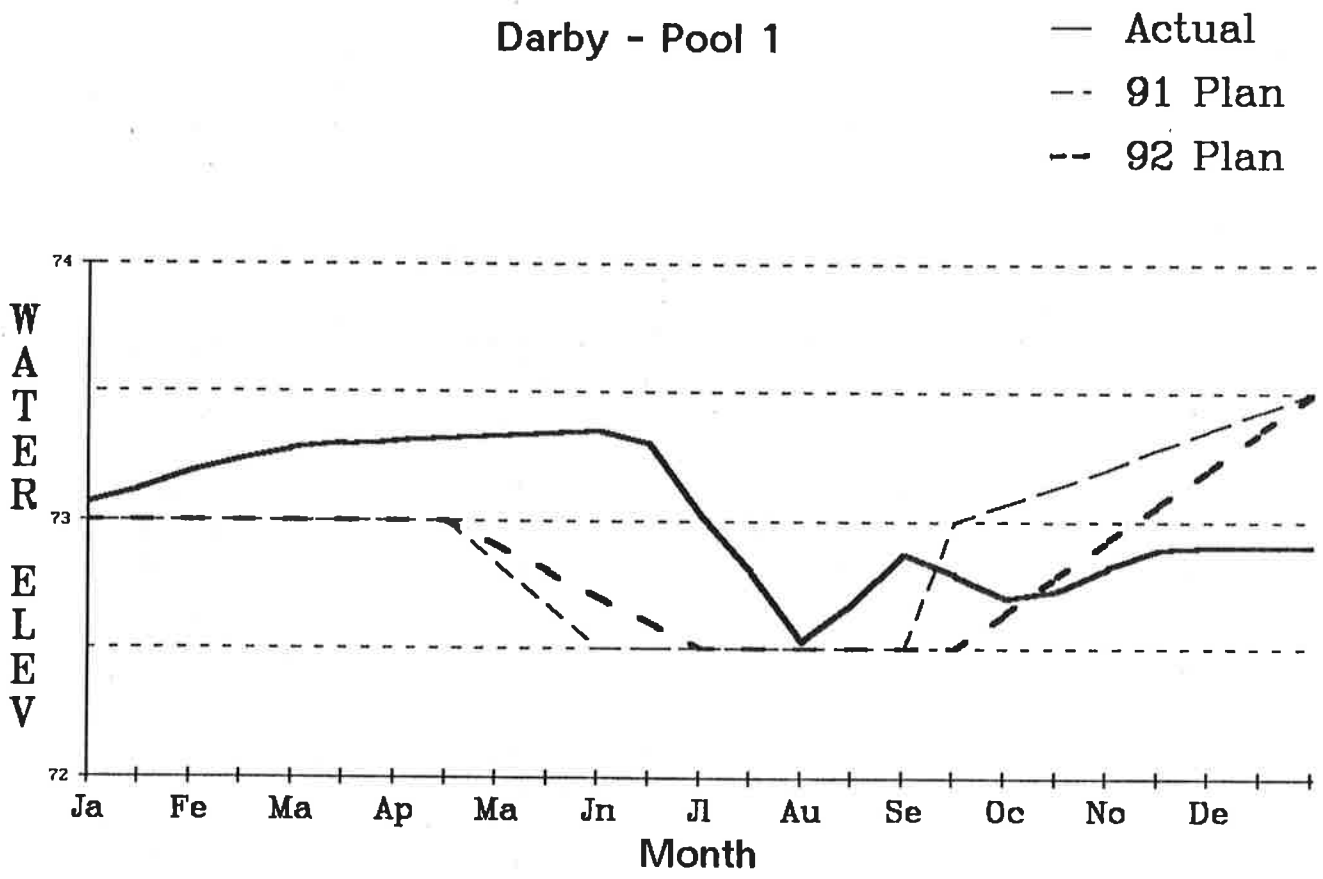
Costs:

Five acres of loosestrife were sprayed by helicopter (50 gallons of a 5% solution of Rodeo). State aerially sprayed the unit free of charge.

B.2 Objectives of 1992 Proposed Water Levels

This unit will be drawn down and kept dry through the summer. Rehabilitation of the dikes mentioned above is a high priority this year and work will commence as soon as work at Darby is complete. Depending on construction progress and plant response to the draw down, flooding will take place sometime in the fall.

1. Unit Darby - Pool 1
2. Acres 200
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 566
5. Water Elev. with 50% bottom exposed - 569
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	25	30	30
Bulrush/Burreed	5	4	4
Cattail, Bluejoint, Other	15	20	15
Floating Emergents	25	25	25
Smartweed/Millet/Nutsedge	10	5	5
Phragmites	10	2	2
Other	10	4	4
Cottonwood/willow	0	10	15

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	110,000	65,610	55,610
Geese	35,700	45,060	45,300
GBH	6,720	4,770	5,300

9. Purple Loosestrife: Large clusters of loosestrife throughout the pool. Sprayed with a 5% solution of Rodeo on a total of 5 acres by helicopter (50 gallons of solution).

A.2 Effects of Past Year's Water Levels

Levels:

Water levels fluctuated with precipitation received and decreased during the summer. Water levels were then slightly increased in the fall.

Results:

Water not choked with spadderdock, pickerel weed or lotus was full of submerged aquatics (canals and east end). Rose mallow, purple loosestrife, and phragmites continued to be a problem in the unit. Waterfowl use (Wood ducks especially) was steady throughout the year. Gadwall and wigeon fed on the submerged aquatics during fall migration.

Facilities:

All dike tops need to be graded and some need gravel.

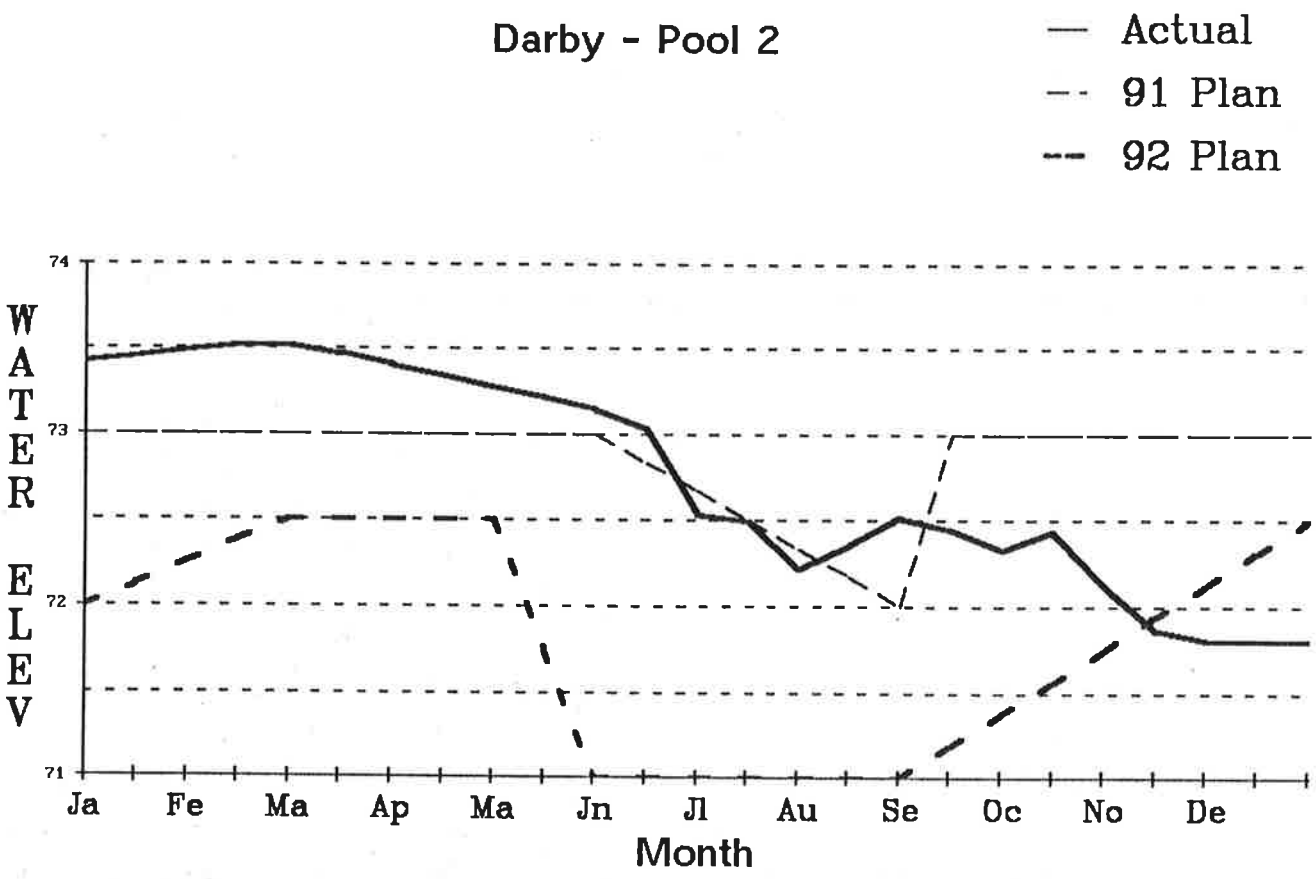
Costs:

All dikes were mowed once in 1991.

B.2 Objectives of 1992 Proposed Water Levels

Maintain moderate to high levels through summer because the other three units will be dry for rehabilitation work.

1. Unit Darby - Pool 2
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water/Submergents	30	26	40
Cattail	20	32	20
Pickerel Weed	30	18	10
Other (Inc. Purple Loosestrife)	10	7	7
Smartweed/Millet/Nutsedge	10	0	3
Cottonwood/willow	0	17	20

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	6,100	14,940	14,940
Geese	850	2,880	2,880
GBH	1,500	210	920

9. Purple Loosestrife: Scattered plants, no control measures taken.

A.2 Effects of Past Year's Levels

Levels:

Water levels steadily decreased during the year. In fall water levels were suppose to have been increased, but by bringing pool 4 down so that water would drain off of neighboring lands pool 2 dropped due to muskrat holes in the dike.

Results:

Purple loosestrife infestation remained stable. Cattail and submergents remain the dominant species. Willow is also common along remnant dikes within the pool.

Facilities:

Dikes along the west and south sides are in good shape. The banks of the north and east dikes are eroded and without rip-rap protection. More work will be done on the north dike in 1992. A new water level gauge was surveyed and placed on the water control structure in 1990.

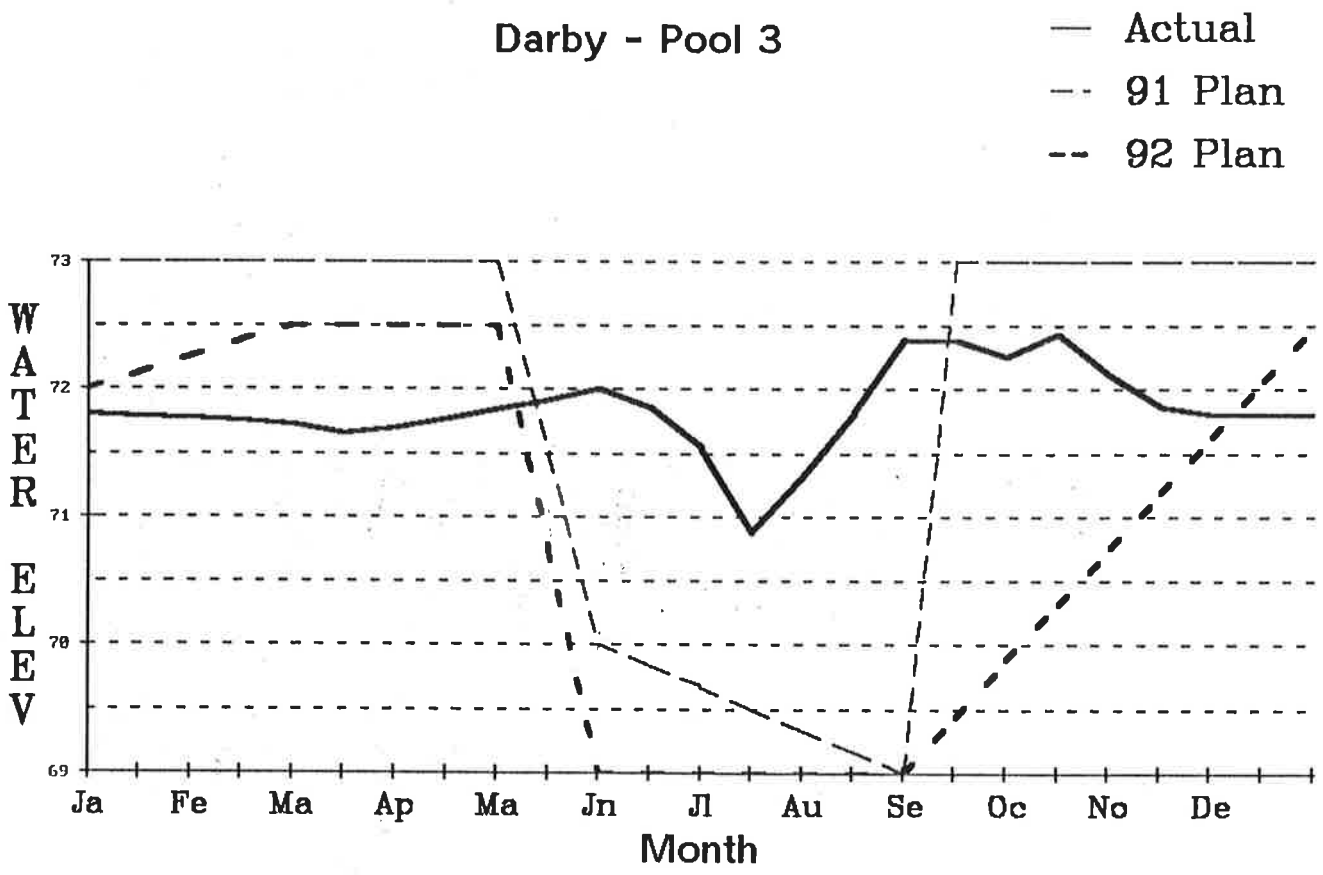
Costs:

Dikes were mowed once. Construction on dikes and pump station, which will aid in water manipulation in Pools 1, 2, 3, and 4, was completed in late 1990. Total electrical cost for this unit was $186.47 (pumping for pool 3 occurred at the same time).

B.2 Objectives of 1992 Proposed Water Levels

Increase water levels slightly through late spring then drain water to dry out the unit for construction work. Construction at Darby is a high priority for 1992. Unit will be reflooded depending on completion of work and plant response.

1. Unit Darby - Pool 3
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	30	18	10
Aquatic Smartweed	10	0	10
Smartweed/Millet/Nutsedge	5	5	5
Other	15	15	3
Pickerel Weed	40	24	10
Cattail		37	40
Loosestrife		5	2
Cottonwood/Willow		16	20

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	25,470	2,100	3,380
Geese	1,500	60	205
GBH	800	870	1,220

9. Purple Loosestrife: A few scattered plants along dikes were sprayed with a 1% Rodeo solution using portable sprayer.

A.2 Effects of Past Year's Levels

Levels:

Water levels were kept relatively stable during the year. Water was allowed to evaporate during mid-summer and then replaced in the fall. Pool 3's water levels decreased in late fall when pool 4 was lowered because of muskrat holes in the adjoining dikes.

Results:

Cattail and pickerel weed dominated the unit. Loosestrife is intermixed with cattail in the south section of the unit. The northern third of the unit produced a moderate stand of smartweed. Waterfowl use of the area was limited.

Facilities:

The north, east and west dikes are eroded on both sides and need resloping and rip-rap protection. The water control structure was replaced in 1989. Work is planned for the north dike in 1992. A water level gauge was surveyed and placed on the water control structure during 1990.

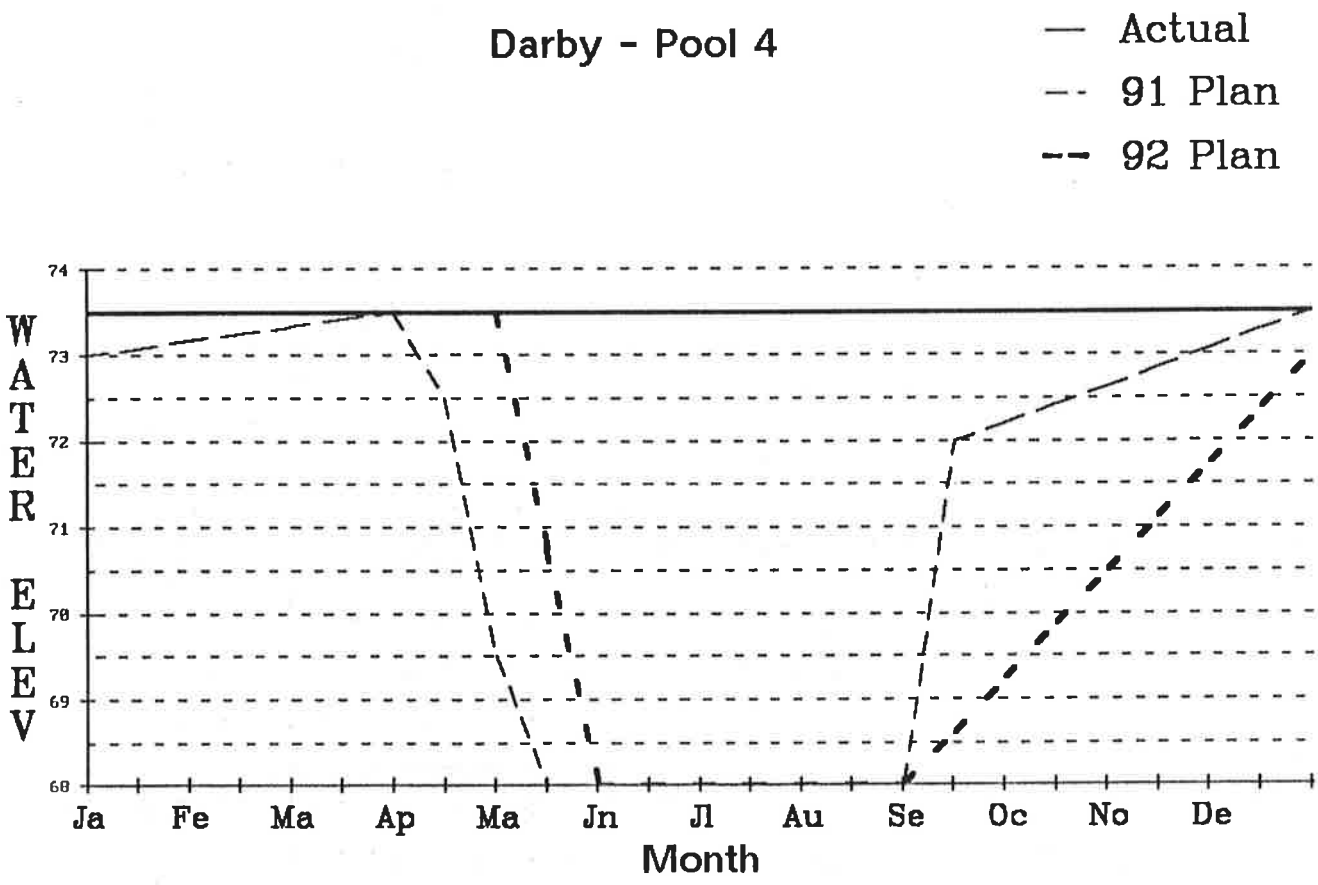
Costs:

Dikes were mowed once. The culvert and screw gate were replaced by the refuge staff in 1989. Purple loosestrife spraying costs were minimal. Electrical costs for pumps was $186.47 (pools 2 and 3 were raised simultaneously).

B.2 Objectives of 1992 Proposed Water Levels

Water levels will have to be dropped to facilitate rehabilitation of dike system. This unit will also have renovation work on it in 1992. The impoundment will then be reflooded depending on completion of work and plant response.

1. Unit Darby - Pool 4
2. Acres 170
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 566.6
5. Water Elev. with 50% bottom exposed - 567.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	75	56	70
Floating emergents	1	5	5
Cattail	5	17	10
Cottonwood/Willow	10	18	10
Other	4	4	5
Smartweed/Millet/Nutsedge	5	0	0

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	53,486	51,600	28,670
Geese	28,600	10,650	10,560
GBH	3,000	3,540	2,980

9. Purple Loosestrife: Scattered plants especially along the dikes, southwest corner, and southeast corner. Helicopter sprayed 20 acres of loosestrife (200 gallons of 5% solution). Another 50 gallons of 1% solution was used and sprayed along dikes in the southeast corner.

A.2 Effects of Past Year's Water Levels

Levels:

The pool water levels were moderate to high throughout the year. Water levels increased during fall and then dropped to assist adjacent land owners in removing water from their property. Graph is only figurative because a water gauge has not been installed.

Results:

The majority of the pool was open water, however, submergents were prevalent. Shallow areas along pools edges developed stands of cattail, willow, and cottonwood with some moist soil plants. This pool was used mostly as a loafing area by waterfowl and gulls.

Facilities:

A water level gauge is needed to record fluctuations of this pool. A screw gate on the south side that allows for drainage of adjacent landowners land needs to be replaced.

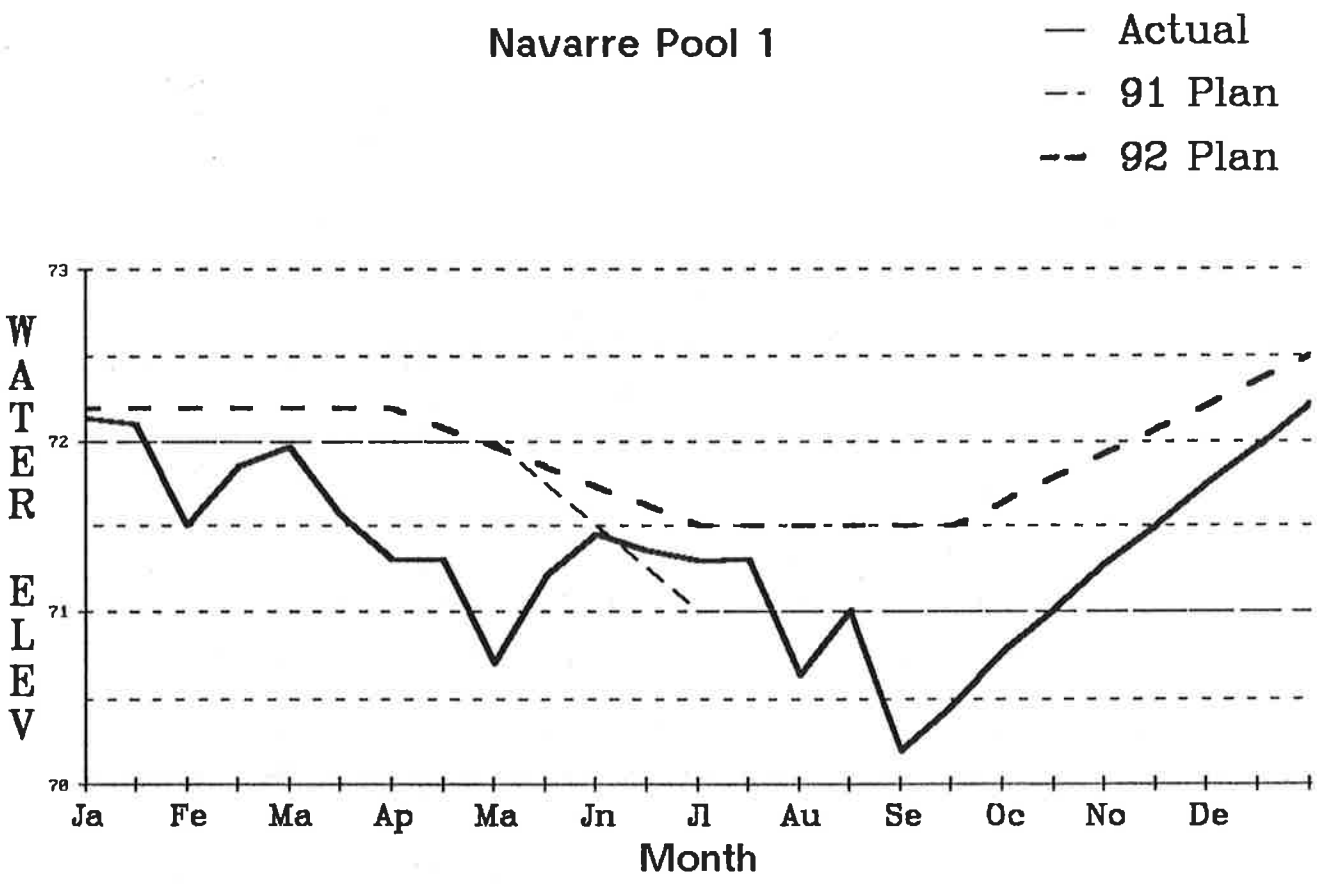
Costs:

All dikes were mowed once. Pumping costs incurred during the summer was $981.83.

B.2 Objectives of 1992 Proposed Water Levels

This pool is scheduled for a draw down in 1992 to increase emergent vegetation, remove carp and to allow the construction of a short ditch/dike. The dike is being constructed so that drainage from private lands can be diverted directed into barrow ditch and then into Lake Erie and not have to go through any of the pools. This is necessary before good water control can be done in this unit. Current plans call for complete draining as soon as possible in the spring/summer. Then flood in the fall after completion of work.

1. Unit Navarre - Pool 1
2. Acres 130
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569.5
5. Water Elev. with 50% bottom exposed - 568.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Open Water/Water Lily	30	30	30
Cattail	30	30	30
Bulrush/Burreed	5	10	10
Cottonwood/Willow	10	15	15
Other	5	5	5
Smartweed/Millet	10	5	5
Submergents	10	5	5

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	81,500	32,460	46,820
Geese	58,600	26,940	32,606
GBH	5,000	1,500	1,800

9. Purple Loosestrife: None observed.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels looked liked a roller coaster ride.

Results:

Cattail, emergents, and submergents dominated the unit. Waterfowl use was average but not great.

Facilities:

All facilities are maintained by Davis-Besse staff. Brush encroachment on the dikes is making censusing difficult as well as damaging the dikes.

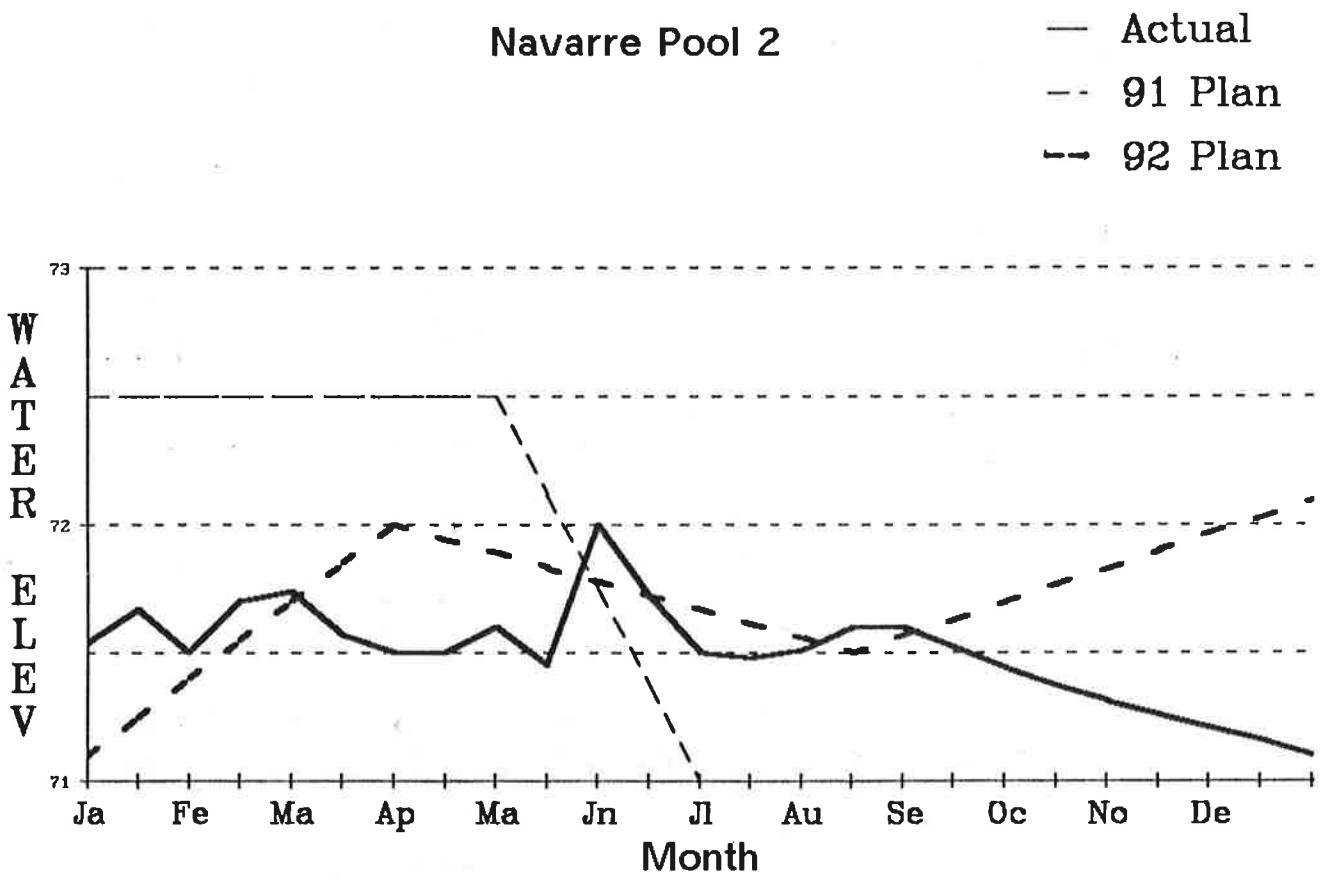
Costs:

All pumping costs are paid for by Toledo Edison.

B.2 Objectives of 1992 Proposed Water Levels

Maintain water levels throughout nesting season. Then allow water to decrease in summer to increase emergents growth. Levels will then be increased slightly in the fall.

1. Unit Navarre - Pool 2
2. Acres 340
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569.5
5. Water Elev. with 50% bottom exposed - 569.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991
Cattail	30	32	40
Bulrush	10	16	5
Burreed	5	5	2
Water Lily/Lotus/Submerged	20	15	15
Other (Bluejoint,mallow, etc.)	10	5	3
Smartweed/Millet	5	2	10
Open Water	20	15	15
Cottonwood/Willow		10	10

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	180,000	38,040	54,870
Geese	120,500	11,460	18,560
GBH	8,000	1,350	1,120

9. Purple Loosestrife: None observed.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were generally stable until fall when levels decreased.

Results:

Cattail and other emergents dominated the unit. Shallow areas had good growth of submergents and emergents. The section towards the west had good stands of smartweed. Southern portions were wet meadow habitat.

Facilities:

All facilities are maintained by Davis-Besse staff. Brush encroachment on the dikes is making censusing difficult as well as damaging the dikes.

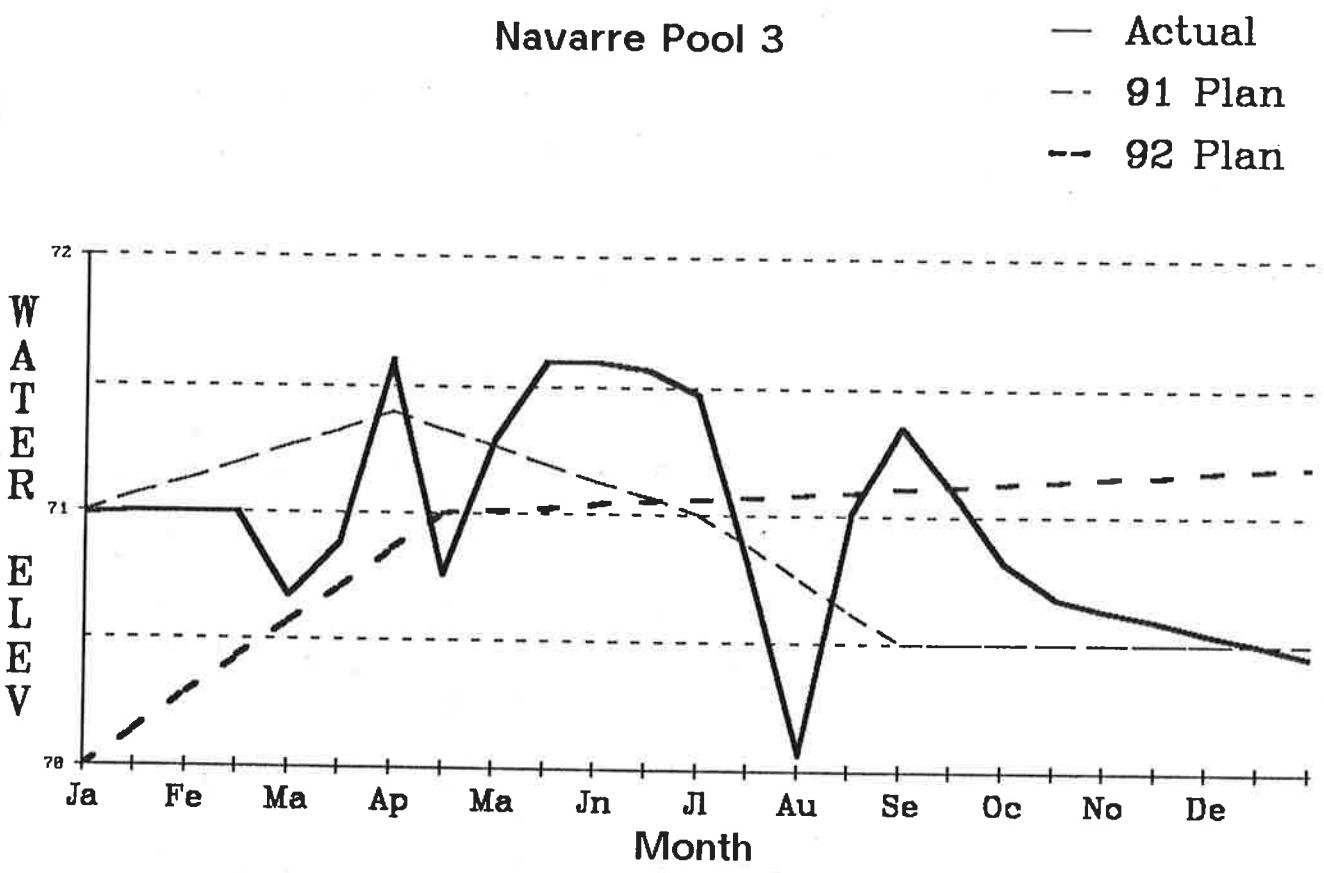
Costs:

All pumping costs were covered by Toledo Edison. No purple loosestrife plants were observed.

B.2 Objectives of 1992 Proposed Water Levels

Water levels should be increased during early spring for the nesting season and kept moderate to high to open up the cattail. Some water should be taken off in the summer to increase invertebrates. Then water should be added for fall migration.

1. Unit Navarre - Pool 3
2. Acres 188
3. Maximum elevation permissible unknown
4. Flowline elevation of lowest structure unknown
5. Water Elev. with 50% bottom exposed - " "
   90% bottom exposed -



7. Vegetation:

Species	%1989	%1990	%1991
Open Water	20	10	10
Smartweed	20	0	5
Willow/Cottonwood/Sumac	5	5	5
Bulrush	40	10	5
Submergents	15	10	5
Cattail	0	65	70

8. Wildlife Use:

	Use Days		
	1989	1990	1991
Ducks	32,500	6,690	2,650
Geese	6,400	4,560	1,150
GBH	1,500	750	150

9. Purple Loosestrife: None observed.

Navarre - Pool 3

A.2 Effects of Past Year's Water Levels

Levels:

Water levels fluctuated greatly during the year.

Results:

Cattail is the dominate species in this unit. Muskrat are using the area extensively. Many Coots used the pool for nesting. Other waterfowl noted in the area were few.

Facilities:

All facilities are maintained by Davis-Besse staff. Flap gates were installed by Davis-Besse staff on the outer dike near the mouth of the river in 1990. A water gauge was surveyed and placed near the pump station by refuge staff in 1990.

Costs:

All pumping costs and the flap gate costs were covered by Toledo Edison. No purple loosestrife was observed.

B.2 Objectives of 1992 Proposed Water Levels

Water levels should be raised slightly before nesting season. Levels should be constant for the remainder of the year. This will allow areas to open up in the dense cattail stands.